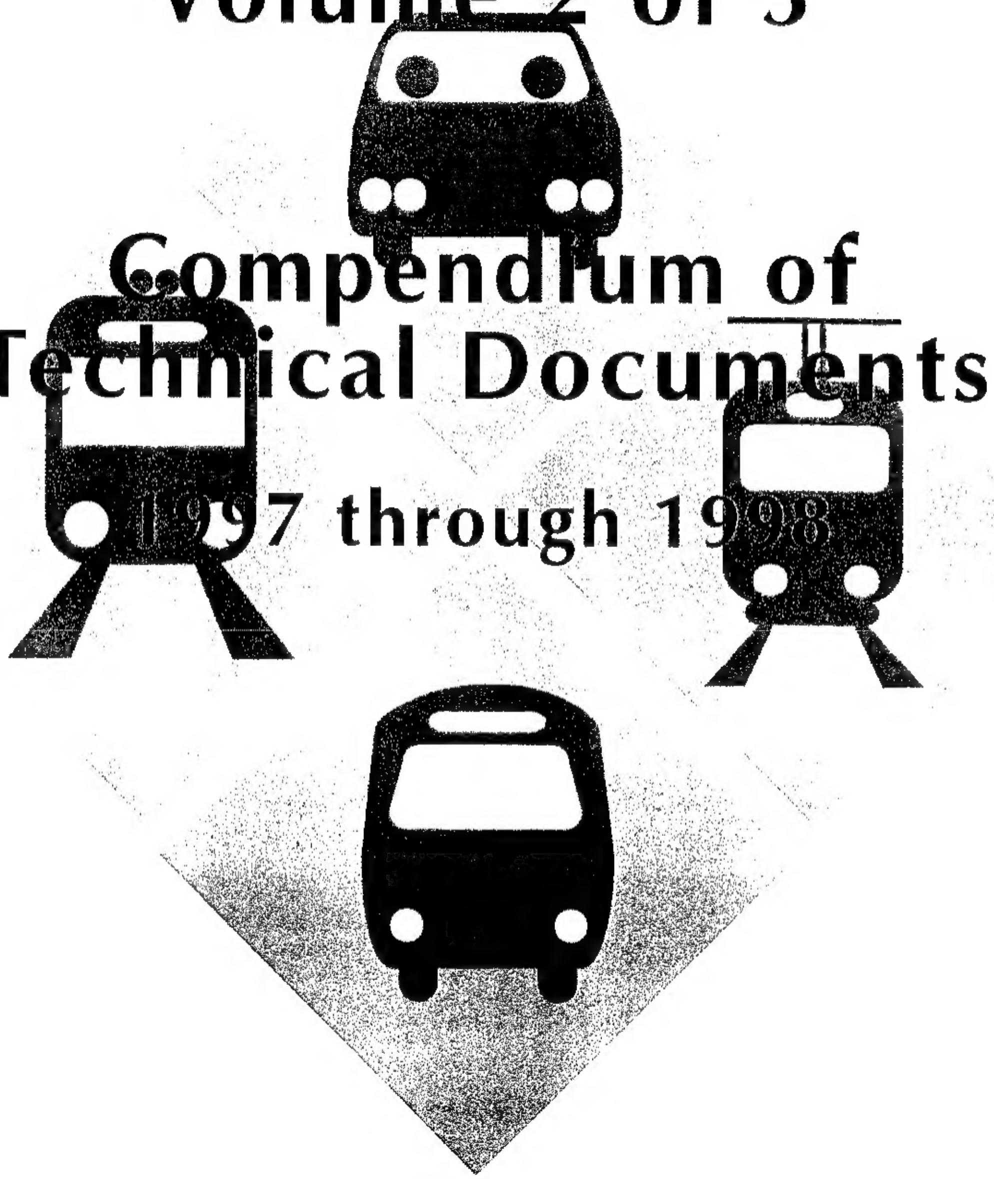
I-66 CORRIDOR Major Investment Study

# Volume 2 of 3



# Compendium of Technical Documents

## 1997 through 1998

April 1999

Virginia Department of Rail and Public Transportation

Virginia Department of Transportation VDOT

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I-66 CORRIDOR Major Investment Study

**Welcome to the I-66 Corridor Major Investment Study. The material in this three-volume set provides documentation of the study process. The material includes the summary report of findings and recommendations prepared at the end of the study process, documentation of advisory committee meetings, and interim technical reports and memoranda produced throughout the study process. Below is a list of the contents in each volume.**

## *Volume 1*

SUMMARY REPORT OF FINDINGS AND RECOMMENDATIONS
POLICY ADVISORY COMMITTEE MEETING AGENDAS AND MINUTES
TECHNICAL ADVISORY COMMITTEE MEETING AGENDAS AND MINUTES

## *Volume 2*

COMPENDIUM OF TECHNICAL DOCUMENTS ♦ 1997 THROUGH 1998

| | |
|---|---|
| • Screen 3 Findings and Technical Recommendation of a Preferred Investment Strategy | October 14, 1998 |
| • Screen 3 Strategy Definition | August 19, 1998 |
| • Screen 2B Results and Recommendations for Screen 3 | June 10, 1998 |
| • Summary of Planning Assumptions | May 12, 1998 |
| • Recommended Unit Cost Data for Use in Screen 2B | April 6, 1998 |
| • Screen 2B Recommendations | March 12, 1998 |
| • U.S. Route 29 Corridor Development Study | March 4, 1998 |
| • I-66 and the Beltway | February 20, 1998 |
| • Screen 2A Results | January 21, 1998 |
| • Screen 2A Travel Demand Results and Conclusions | December 11, 1997 |
| • Screen 2A Travel Modeling Results | December 10, 1997 |
| • Final Purpose and Need Statement | November 25, 1997 |
| • Travel Mode Sensitivity to Auto Operating Costs | November 12, 1997 |
| • Summary of Goals and Evaluation Measures | November 1997 |
| • Screen 2 Strategy Refinement | November 1997 |
| • Draft Northern Virginia Regional Travel Model Model Update and Validation Report (under separate cover) | September 1997 |
| • Draft Screen 2 Multi-Modal Investment Strategies Network Definition | September 23, 1997 |
| • Growth in Households and Employment in the I-66 Corridor Land Use Forecasts, Version 5.3 | September 17, 1997 |
| • Screen 2 Multi-Modal Strategies | August 1997 |
| • 1990 and 2020 Corridor Travel Patterns | July 9, 1997 |
| • Assumptions Regarding the Capital Beltway | July 1, 1997 |
| • Screen 2 Multi-Modal Strategy Definition | June 1997 |

## *Volume 3*

COMPENDIUM OF TECHNICAL DOCUMENTS ♦ 1995 THROUGH 1996

| | |
|---|---|
| • Screen 1B Travel Demand Forecasting Results | October 17, 1996 |
| • Universe of Alternatives and First Screen Evaluation | January 9, 1996 |
| • Draft Purpose and Need Statement | September 1995 |
| • Methods Reports | September 15,1995 |
| • Informer Newsletter #1 | September 1997 |
| • Informer Newsletter #2 | February 1996 |
| • Informer Newsletter #3 | November 1995 |
| • U.S. Route 29 Traveller Newsletter | December 1996 |

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I-66 CORRIDOR Major Investment Study

# Screen 1B Travel Demand Forecasting Results

October 17, 1996

# SCREEN 1B TRAVEL DEMAND FORECASTING RESULTS

*Prepared for:*

**The Commonwealth of Virginia**
Department of Rail and Public Transportation
and
Department of Transportation

*Prepared by:*

**BRW, Inc.**
**and**
**KPMG Peat Marwick**

October 17, 1996

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# SUMMARY

## INTRODUCTION

The I-66 Corridor MIS will identify a Locally Preferred Investment Strategy based on a successive, iterative evaluation of modal elements and alternative transportation strategies through a multi-step screening process:

- Screen 1A: Initial analysis of Universe of Alternative Elements
- Screen 1B: Travel demand analysis of single-mode alternative elements
- Screen 2: Formulation and analysis of multi-modal investment strategies
- Screen 3: Identification of the Locally Preferred Investment Strategy

The travel demand forecasts for Screen 1B have been completed and this document contains the results of the forecast and conclusions relative to the alternative modal elements that should be carried forward into the Screen 2 evaluation.

## TRAVEL DEMAND FORECASTS

Travel demand forecasts for Screen 1B were completed using the Dulles Corridor Transit Study Travel Demand Model and the MWCOG Land Use Version 5.2 socioeconomic forecasts. The model has been applied to develop Year 2020 transit and highway forecasts for seven modal scenarios:

- Baseline Scenario - The existing transportation system along with planned transportation system improvements documented in the CLRP.
- Enhanced Baseline Scenario - The baseline scenario with bus transit system enhancements.
- Alternative 3C - Barrier separated HOV lanes to Gainesville.
- Alternative 4C - Improvements to I-66, Route 50, and Route 29.
- Alternative 6C - LRT service from the Vienna Metrorail station to both Manassas and Route 50/28.
- Alternative 7A1 - Metrorail service extension to Centreville.
- Alternative 7B - Metrorail service extension to Route 50/28.

A revised regional travel model (The Northern Virginia MIS Regional Travel Model) incorporating an expanded geographic area is currently being developed. This revised model will be used to evaluate alternative elements that extend into the western portion of the study area including HOV extension along Route 29 to Route 15 (Alternative 3B), VRE extension to Gainesville/Haymarket, and Metrorail extension to Gainesville (Alternative 7A2).

## MEASURES OF EFFECTIVENESS

The measures of effectiveness defined for evaluation in Screen 1B are as follows:

- Study area mode split
- Vehicular and transit travel times
- Roadway Level of Service
- Reverse commute transit trips served
- Transit ridership by mode
- Roadway vehicle miles of travel
- Roadway vehicle hours of travel
- Roadway vehicle hours of delay

Additional measures of effectiveness will be defined for subsequent screens in the alternative evaluation process.

## RESULTS AND CONCLUSIONS

Key results and conclusions of the Screen 1B analysis are displayed in Table S-1. The primary conclusions of the analysis are as follows:

- None of the alternative elements when analyzed in isolation will have a significant effect on traffic operations measured in terms of volume to capacity ratio.

- It is recommended that Alternative 3A access improvements to the existing concurrent flow HOV lanes on I-66 not be carried forward to Screen 2. The forecast HOV-2+ travel demand exceeds the capacity of the existing concurrent flow HOV lane.

- It is recommended that HOV-3+ restrictions on I-66 HOV facilities be evaluated as part of Screen 2.

- It is recommended that Alternative 7B, Metrorail extension to Route 50/28, not be carried forward to Screen 2. While forecast station boardings are favorable, the length of the route and number of stations make the extension of Metrorail to Route 50/28 less desirable than the extension of Metrorail to Centreville.

## TABLE S-1
## SCREEN 1B EVALUATION - RECOMMENDATIONS

| ELEMENT NUMBER | DESCRIPTION | RECOMMENDATION | DISCUSSION |
|---|---|---|---|
| 1* | Baseline Scenario | Evaluate in Screen 2 | The baseline and enhanced baseline are the base for comparison of other alternative elements. |
| 2* | Enhanced Baseline | Evaluate in Screen 2 | The baseline and enhanced baseline are the base for comparison of other alternative elements. |
| 3A | HOV Access Improvements | [redacted] | Forecast HOV-2+ travel demand exceeds the capacity of the existing concurrent flow HOV lane. |
| 3B | HOV Extension | Evaluate in Screen 2 | Evaluate with Northern Virginia MIS Travel Model. |
| 3C* | Barrier Separated HOV | Evaluate in Screen 2<br>Evaluate HOV-3+ in Screen 2 | Barrier separated HOV lanes required to accommodate forecast HOV travel demand. |
| 4A | I-66 Improvements | Evaluate in Screen 2 | Forecast travel demand fully utilizes incremental capacity. |
| 4B | Upgrade Routes 29 and 50 | Evaluate in Screen 2 | Forecast travel demand fully utilizes incremental capacity. |
| 4C* | Improvements to I-66, Route 29 and Route 50 | Evaluate in Screen 2 | Forecast travel demand fully utilizes incremental capacity. |
| 5 | VRE Extension | Evaluate in Screen 2 | Evaluate with Northern Virginia MIS Travel Model. |
| 6A | LRT to Route 28/50 | Evaluate in Screen 2 | See 6C. |
| 6B | LRT to Manassas | Evaluate in Screen 2 | See 6C. |
| 6C* | LRT to Route 28/50 and Manassas | Evaluate in Screen 2 | Transit ridership forecasts greatly exceed Riders per Route-Mile of recently constructed LRT systems. |
| 7A* | Metrorail to Centreville | Evaluate in Screen 2 | Forecast station boardings on Metrorail extension to Centreville compares favorably to existing Metrorail system station boardings. Extension to Gainesville requires evaluation with Northern Virginia MIS Travel Model. |
| 7B* | Metrorail to Route 28/50 | [redacted] | Forecast station boardings are slightly less than Metrorail extension to Centreville with more stations (7 to Rt. 50/28, 4 to Centreville) and more miles of service (17 miles to Rt. 50/28, 11 miles to Centreville). |
| 11 | Reversible General Purpose Express Lanes | Evaluate in Screen 2 | Evaluate with Northern Virginia MIS Travel Model. |

* These elements were modeled as part of the Screen 1B Evaluation.

# 1.0 INTRODUCTION

The Virginia Department of Rail and Public Transportation (DRPT) and the Virginia Department of Transportation (VDOT) sponsor the I-66 Corridor Major Investment Study which responds to a joint resolution of the Virginia General Assembly. Working with local jurisdictions, regional agencies, and the public, the study will propose a transportation investment strategy to address east-west travel needs in the I-66 Corridor between the Capital Beltway (I-495) in Fairfax County on the east and U.S. Route 15 in Prince William County, Virginia, on the west.

The I-66 MIS seeks to develop a regional consensus on a comprehensive transportation investment strategy appropriate to address problems in the corridor over the next 20-25 years which:

- Responds to current imbalances between existing transportation supply and demand;
- Supports anticipated growth and development in the corridor;
- Integrates the multi-modal transportation systems in the corridor;
- Enhances other transportation facility and land use development decisions in the corridor; and
- Supports previous and on-going regional and local transportation planning processes.

This document describes the evaluation criteria used for Screen 1B, presents the results of the travel demand forecasts and the analysis of the alternatives, and recommends which alternatives should be dropped from further consideration.

# 2.0 OVERVIEW OF I-66 TRANSPORTATION STRATEGY DEVELOPMENT PROCESS

The evaluation process for this study appears as Figure 1. This approach is based on the successive, iterative evaluation of modal elements and alternative strategies through a multi-step screening process:

- Screen 1A: Initial Analysis of Universe of Alternative Elements
- Screen 1B: Analysis of Single-mode Alternative Elements and Formulation of Multi-modal Alternatives
- Screen 2: Reconfiguration and Analysis of Multi-modal Investment Strategies
- Screen 3: Identification of the Locally Preferred Investment Strategy

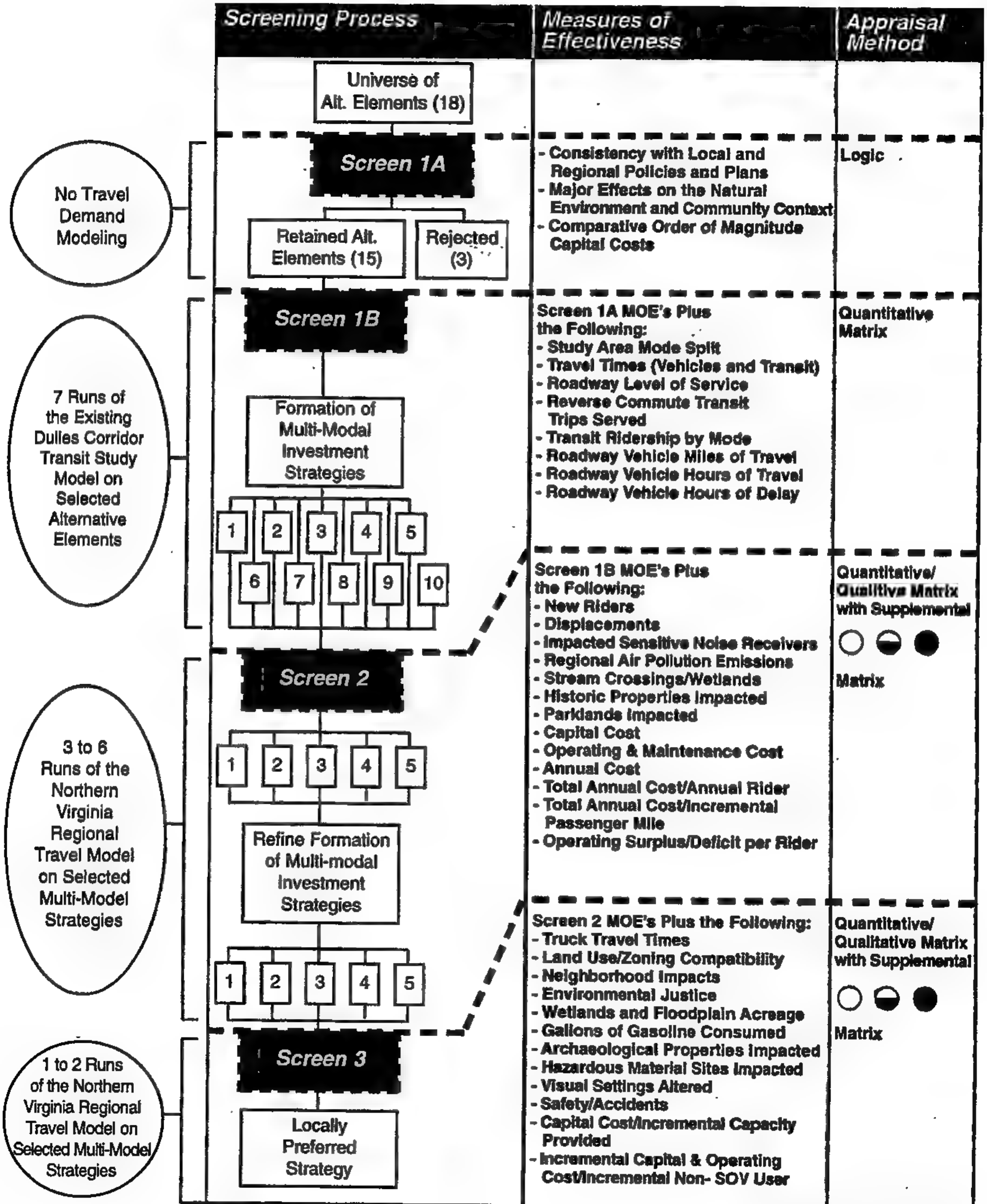
Through this process, the performance of alternatives in meeting study goals and objectives will be assessed using measures of effectiveness and appraisal methods developed in cooperation with study participants. Each step in the screening process will identify those alternatives which are the best performers in terms of meeting Corridor needs, and which should therefore be carried forward for more detailed evaluation. A second, equally important function of the screening process is to provide insight into how the alternatives can be refined, modified or reconstituted to improve the extent to which the alternative addresses Corridor needs. Measures of effectiveness include criteria for assessing the relative performance of the alternatives with respect to transportation service, engineering feasibility, environmental effects, and value for cost expended. Appraisal procedures to be used will include logic, quantitative/qualitative matrices, and "Consumer Reports" style summary tables.

Early in the process, a wide range of single-mode alternative elements were evaluated against a few select measures with the greatest potential to differentiate among them (Screen 1A and Screen 1B). At the end of Screen 1B, the highest performing single-mode alternative elements will be used to formulate a lesser number of multi-modal alternatives. These multi-modal alternatives will be evaluated in Screen 2 using a greater number of more detailed measures, along with those from Screen 1A and Screen 1B. Based on the results of Screen 2, a reduced number of multi-modal investment strategies will be reconfigured and analyzed based upon the criteria used in previous steps, along with even more detailed measures. The process will culminate in the identification of a single locally preferred, multi-modal major investment strategy for the I-66 Corridor.

As shown in Figure 1, travel demand forecasting will be completed as part of Screen 1B, Screen 2, and Screen 3. During Screen 1A, no travel demand forecasting was scheduled. In Screen 1B, the existing Dulles Corridor Transit Study Travel Demand Model (Dulles Model),

**Figure 1**

# Overview of I-66 MIS Alternative Elements/Strategies Evaluation Process




Note: Screen 1B will use MWCOG Land Use Version 5.2. Subsequent screens will use Version 5.3. Fig. 1 #9606-0047

which became available in May, was applied to seven selected alternative elements. Screen 1B is based on the Metropolitan Washington Council of Governments (MWCOG) Land Use Version 5.2.

VDOT and DRPT are developing the Northern Virginia MIS Regional Travel Model. This model will be based on the Dulles Study modeling procedures, but will include an expanded and refined travel zone structure and updated MWCOG Land Use Version 5.3 will be incorporated. The Northern Virginia MIS Regional Travel Model will be applied in Screen 2 and Screen 3.

# 3.0 SCREEN 1B EVALUATION CRITERIA

As a result of Screen 1A, Initial Analysis of the Universe of Alternative Elements, the eighteen (18) single-mode elements comprising the universe of alternatives were narrowed to fifteen (15) alternative elements.

Screen 1A alternative elements were evaluated in terms of their ability to meet study goals and objectives based on following measures of effectiveness:

- Consistency with local and regional policies and plans;
- Major effects on the natural environment and community context; and
- Comparative order of magnitude capital costs.

Screen 1B consists of completing travel demand forecasts for the single-mode alternative elements that survived Screen 1A, and using the best performers to formulate multi-modal alternatives. Screen 1B involves application of the existing Dulles Model to selected alternative elements, discussed in more detail in the following Section. In addition to criteria used in Screen 1A, the Screen 1B measures of effectiveness include:

- Primary Study Area Mode Split - 2020 Daily Person Trips (Linked) By Mode in Study Area.

- 2020 Travel Times (Transit, SOV and HOV) for Selected Trip Origins and Destinations.

- Roadway Level of Service - 2020 Screenline PM Peak Hour Volume/Capacity (LOS E) Ratios, average daily traffic (2020) at screenline locations, and traffic counts and forecasts at selected locations.

- Roadway Level of Service (LOS) - 2020 PM Peak Hour Level of Service on Study Area Roadway System.

- Reverse Commute Transit Trips Served - 2020 Transit Markets (Work Trips).

- Transit Patronage Forecasts by Mode - 2020 Daily Transit Trips by submode in the Study Area, estimated rail station boardings, and rail station mode of arrival.

- Vehicle miles of travel, vehicle hours of travel, and vehicle hours of delay on Study Area roadways.

# 4.0 SCREEN 1B TRAVEL DEMAND FORECASTS

## 4.1 MODEL OVERVIEW

The description of the Dulles Rail Study travel demand procedures presented below is taken from the report, *Virginia MIS Travel Forecasting Procedures,* prepared by Parsons Brinckerhoff Quade and Douglas, Inc.

The travel demand procedures developed for the Dulles Rail Study consist of the travel markets which can be analyzed from the origin-destination survey conducted by the MWCOG. These markets, therefore, are the travel made by the residents of the region using their own automobiles, the public transit system, the public taxi system, and personalized non-motorized modes (i.e. walk and bicycle). The markets do not include the trips made by non-residents (such as tourists), trips made to and from outside the region, and trips made by commercial vehicles (i.e. trucks) even if these vehicles are driven by residents of the region. The models used to estimate these markets have been designed to be, as much as practical, state of the art models. Care has been taken to only specify information needed to apply the models, which the MWCOG staff already obtains or forecasts. For example, the land use data required is simply the number of households, the population, the total employment, and the retail employment. Because of the policy to minimize the requirements for "exogenous" data, the models include several sub-models which estimate non-travel demand items, such as parking cost, automobiles, and labor force.

The design of the travel demand procedures was performed using several objectives and constraints. The major objectives, or goals, in the design of the travel demand models were:

1. That the models should meet the requirements of the new federal regulations, especially the Clean Air Act Amendments.

2. That the models should consider all possible modes available in the region, including walk, bicycle, taxi, transit, and highway travel. That the transit modes should include explicitly local bus travel, express bus travel, rail travel, and commuter rail travel. The highway travel should include, explicitly, High Occupancy Vehicle (HOV) travel, use of pay (toll) road, and the standard highway travel.

3. That accessibility (or mobility) measures should be included in all possible model sets and should be multi-modal. Also, accessibility measures should include time and cost if possible.

4. That land use form should be included in the models where possible.

5. That the models should be compatible with the MWCOG's present transportation planning software (MINUTP) but should not be limited to the present capabilities of MINUTP, especially the microcomputer memory limitation.

6. That the models should incorporate and extend the present series of MWCOG models. For transit modeling this means a mode choice, sub-mode choice, mode of arrival and station selection capability.

7. That the building, storing, and retrieving of the transportation networks should be a disciplined procedure which includes relating the transportation networks to the land use of the immediate area and which also relates the transit network information to the highway network information.

Some of the constraints imposed upon the model development were:

1. That the observed data be already collected. This is primarily the MWCOG origin-destination survey and the WMATA on-board surveys.

2. That the model use the zone and link constraints of the MINUTP software. The major (written) constraint this imposes is that the network cannot have more than 32,000 links. In practice, and in this system, the number of traffic analysis zones is limited to 2,500.

3. The model should be capable of accepting the new "extended" MWCOG zone system of up to 2,250 zones.

An important element of the model design is the designation of the travel markets by purpose. This stratification allows for a more precise calibration of the models and also allows the analyst to focus on the essential characteristics of the trip and the person making the trip. For example, it is fairly obvious that shopping trips are "attracted" to areas which have retail employees. The purposes used in this study are fairly standard categories. There are some differences from normal practice in the definition of the non-home based trips (those trips which are made with neither end at the home of the traveler). In the Dulles Model, the Non-home Based (NHB) trips are stratified into two categories of work related trips and one other category. The two work related trip categories are: (1) those NHB trips which take place on the person's trip to and from work, and; (2) those NHB trips which take place while a person is at work. The travel markets are stratified into purpose categories, which are:

1. Home Based Work: Trips between home and the work location for the purpose of work.

2. Home Based University: Trips between home and school for the purpose of school by persons over the age of 18.

3. Home Based Shopping: Trips between home and a location for the purpose of shopping.

4. Home Based Other: Trips between work and any other location (purpose) not included in the first three markets.

5. Non-home Based Journey to/from Work: Any trip with neither end at home and which was made between the "extended" journey between workplace and home. For example, if a person ate breakfast at a restaurant and then went to work, the between the restaurant and the workplace would be a Non-home Based Journey to/from work.

6. Non-home Based Journey at Work: Any trip with neither end at home and which was made during the working hours. For example, if a person visited another office for a meeting, the trip would be Non-home Based Journey at work trip.

7. Non-home Based Other: A trip with neither end at home and not associated with work.

The travel demand models require transportation networks. This includes a highway network, a transit network, and a bicycle network. The highway network is stored in a data base (using the microcomputer DBASE program) and this data base contains information on the physical attributes of the highway links, the zonal land use data, and speed count data where available. The transit data base stores information about the transit routes, including the itineraries of the route, the headways, and the scheduled speeds (for present routes). The transit routes are "linked" to the highway links and the transit speeds are functions of the highway speeds.

The estimation of highway speeds and capacities are based on the type of highway and the type of land use in the vicinity of the highway. The transportation network data base management system includes a model to estimate the type of land use by traffic analysis zone and will assign this land use category to the highway links. The land use categories are defined with respect to the population and employment densities of the traffic analysis zones and there are seven of these categories. The definitions of these categories are shown in Table 1:

**TABLE 1**
**DEFINITION OF LAND USE CATEGORIES**
**(Value in Table is the Category)**

| POPULATION DENSITY | EMPLOYMENT DENSITY (EMPLOYEES PER SQUARE MILE) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 - 100 | 101 - 350 | 351 - 1,500 | 1,500 - 3,550 | 3,551 - 13,750 | 13,751 - 15,000 | >15,000 |
| 0 - 750 | 7 | 6 | 5 | 3 | 3 | 3 | 2 |
| 751 - 1,500 | 7 | 5 | 5 | 3 | 3 | 3 | 2 |
| 1,500 - 3,500 | 6 | 5 | 5 | 3 | 3 | 2 | 2 |
| 3,501 - 6,000 | 6 | 4 | 4 | 3 | 2 | 2 | 1 |
| 6,001 - 10,000 | 4 | 4 | 4 | 2 | 2 | 2 | 1 |
| 10,001 - 15,000 | 4 | 4 | 4 | 2 | 2 | 2 | 1 |
| >15,000 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |

Instead of category numbers, the land use categories were assigned names which, in general, describe the area. These labels are:

1. Urban High Density
2. Urban Commercial
3. Urban Residential
4. Suburban Commercial
5. Suburban Residential
6. Exurban
7. Rural

A map of the area types by traffic analysis zone is presented in Figure 2. In addition to using these definitions for the specification of the highway speeds and capacities, these definitions were also used in the trip generation and mode choice models.

The transportation network data base system also includes programs to build walk and automobile centroid connectors for the transit network. This reduces the manual labor required to code a transit network and will provide for a "reproducible" network. The procedure reduces the judgment required in the coding of the centroids, thus eliminating manual coding errors.

The bicycle network includes all the highway links except the limited access links, links for bike only paths and bike paths on highways.

The travel demand models used to estimate the trips are an enhanced four step process of trip generation, distribution, mode choice and assignment. Transportation accessibility is considered in all the modeling steps, including trip generation and the time of day modeling. The general structure for the models is shown in Figure 3.

The first of the four step process is the trip generation model. The trip generation model includes a model to estimate productions and a model to estimate attractions. The trip generation model also includes a series of sub-models to estimate households by family size, automobile ownership, and workers per household, which are the demographic procedures. These sub-models were estimated using the 1990 census data and use as independent variables (input data) the number of households and population per zone and the relative income of the zone (in terms of the regional income). The relative income of the zone was obtained from the 1990 census data and it is anticipated that this information will be used in the forecast unless a planning group wishes to make these income forecasts. The relative income measure is the ratio of the average zonal income to the regional income. The initial sub-models estimate the number of households by income, family size, and workers. This information is then used with accessibility measures to estimate households by family size, workers, and automobiles owned. There are three accessibility measures used for this model. These measures are: (1) the number of employees within one mile of the zone (a measure of walk accessibility); (2) the number of employees within 40 minutes of peak period transit travel time (a measure of transit accessibility); and (3) the number of employees within 6 miles of the zone (a land use "form" measure). The two distance measures are straight line measurements--not over the highway network. The final estimates from these sub-models is the number of households (in each zone) stratified by the three socio-economic characteristics of family size, workers, and cars owned. Since this three way stratification produces a considerable number of possible household types

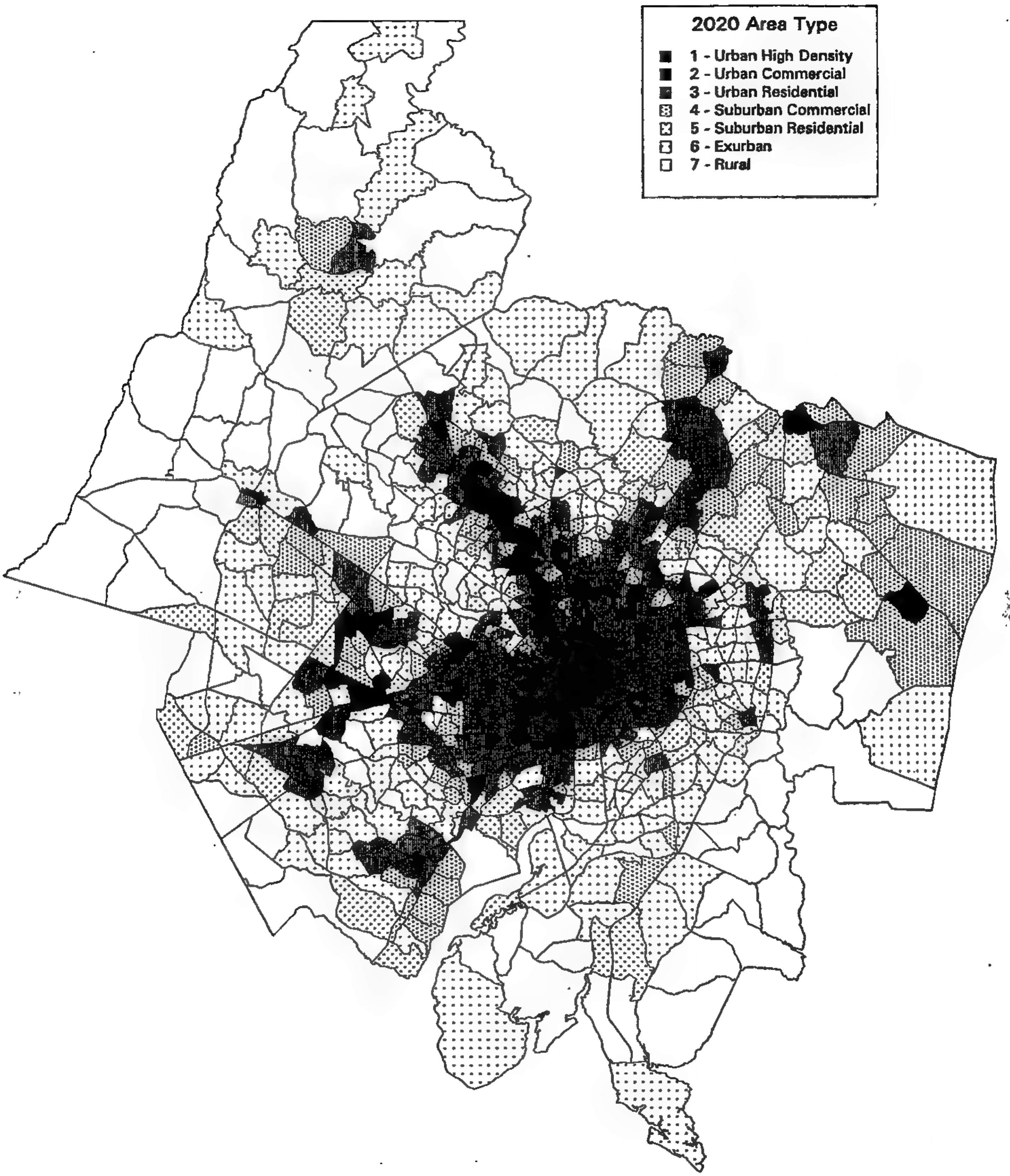
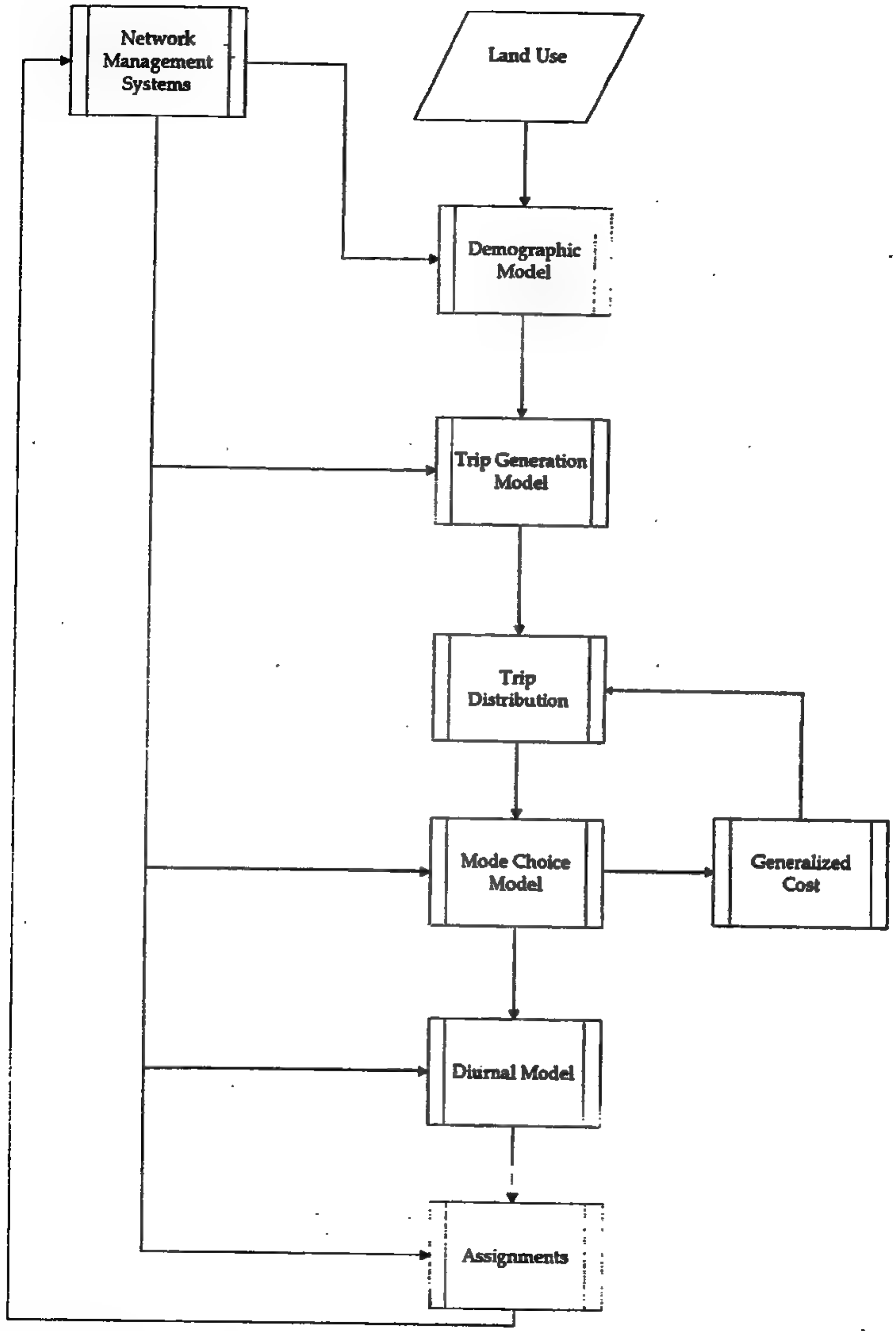



Figure 2
**Land Use Area Types By Traffic Analysis Zone**

# GENERAL MODEL STRUCTURE




Source: Virginia MIS Travel Forecasting Procedures.
Applications Package Overview

Figure 3
**General Model Structure**

the estimated households are "held" as real values (i.e. there may be 1.134 households in a zone with no cars, two people, and one worker). The automobile ownership model, which estimates the number of households by 0, 1, 2 and 3+ automobiles, is very sensitive to the three accessibility measures, with the number of total automobiles decreasing as the walk and transit accessibility increases and increasing as the land use form measure decreases. This "movement" of the model is especially strong in the estimation of the zero car households.

The estimation of productions (the trip ends associated with the traveler's home) and attractions (the trip ends associated with the non-home end of the trip) is performed by the automobile strata. There are trips estimated for zero car households, one car households, two car households and three or more car households. Indeed the entire model chain of generation, distribution, and mode choice is stratified by the four automobile owned strata.

In the production models the demographic measures are extremely important in estimating the productions, while the land use estimates of households, retail employment, and total employment are important in estimating the attractions. In both models, measures of accessibility were developed and explored.

The distribution model is a standard gravity model. The input zone to zone measure used in the model is the generalized cost from the mode choice model. This generalized cost includes both travel time and costs for all modes including walking, bicycling, transit, taxi, and highway.

The mode choice model is a nested logit model which considers all modes in the region. The top nest of the model has four major modes: (1) highway; (2) transit; (3) taxi; and (4) non-motorized modes. The non-motorized mode has a single nest of two sub-modes: (1) walk; and (2) bicycle. The highway mode has a drive alone and group nest. The group nest is further divided into 2 persons per car and 3+ persons per car. Each of the groups (including drive alone) has a final nest which is to use toll roads or free roads. The transit mode is nested by sub-mode including local bus, rail, commuter rail, and express bus. Under each sub-mode is the four potential modes of arrivals; walk, feeder bus, park and ride, and kiss and ride. For each combination of mode of arrivals (except walk) the four best stations are identified and used in the final (bottom) nest. The transit nest therefore includes a sub-mode, mode of arrival, and station selection model.

The trip generation, distribution, and mode choice models are applied for daily trips. The travel times used for the work trips are the peak hour travel times while the off-peak travel times are used for the other purposes. After the mode choice model, the user may select to build trip tables for a given period, such as the peak hour. For all transit trips and highway vehicle trips not occurring in the peak hour, the time of day model is a series of factors by trip purpose. For the peak hour calculations, the distance of the trip and the congestion index of the interchange (defined as the difference between the congested time and the uncongested time) are used to estimate the peak hour travel as a proportion of the peak period (3 hours) travel. The peak hour, as a proportion of the peak period, can range between 55 percent and 33 percent.

The highway assignment procedure, for the peak hour, is an equilibrium capacity constraint procedure. The volume/capacity relations used to modify the travel times have been revised to closer approximate the actual conditions. This was done by reviewing the research which has been performed on these relations in the last ten years.

## 4.2 ALTERNATIVES EVALUATED

The fifteen single-mode alternative elements carried forward from the Screen 1A evaluation process are shown in Table 2:

**TABLE 2**
**INITIAL SINGLE-MODE ALTERNATIVE ELEMENTS**

| ELEMENT NUMBER | DESCRIPTION |
|---|---|
| 1 | Baseline Scenario - The existing transportation system along with planned transportation system improvements as documented in the Constrained Long Range Plan (CLRP). |
| 2 | Enhanced Baseline - The baseline scenario with transit system enhancements. |
| 3A | HOV Access Improvements - Additional dedicated HOV accesses to the existing HOV lanes in the I-66 Corridor. |
| 3B | HOV Extension - In addition to the additional HOV accesses, the existing HOV lanes in the I-66 Corridor would be extended along Route 29 from I-66 to Route 15. |
| 3C | Barrier Separated HOV - I-66 from Gainesville to I-495 would be reconstructed to provide limited-access barrier separated HOV lanes. |
| 4A | I-66 Improvements - Widen I-66 from Route 50 to I-495 to provide one or more additional general purpose lanes in each direction. |
| 4B | Upgrade Routes 29 and 50 - Reconstruct Routes 29 and 50 from Route 28 to I-495 as super arterial roadways with six lanes and grade separations at major cross streets. |
| 4C | Improvements to I-66, Route 29 and Route 50 - Widen I-66 (Element 4A) and upgrade Routes 29 and 50 (Element 4B). |
| 5 | VRE Extension - Extend the existing Virginia Railway Express (VRE) commuter rail service from Manassas along the existing Norfolk and Southern railroad to Gainesville and/or Haymarket. |
| 6A | LRT to Route 28/50 - Light Rail Transit (LRT) service would be constructed from the Vienna Metrorail station following I-66, Route 50 and possibly extending along Route 28 to Dulles Airport. |
| 6B | LRT to Manassas - LRT service would be constructed from the Vienna Metrorail station following Route 29 through Fairfax City to Route 28. |
| 6C | LRT to Route 28/50 and Manassas - LRT service would be provided to both Route 28/50 (Element 6A) and Manassas (Element 6B). |
| 7A | Metrorail to Gainesville - Metrorail would be extended in the median of I-66 to a terminal station in the vicinity of either Centreville or Gainesville. |
| 7B | Metrorail to Route 28/50 - Metrorail would be extended in the median of I-66 to Route 50 then north to Route 28 and possibly continuing to Dulles Airport. |
| 11 | Reversible General Purpose Express Lanes - I-66 would be reconstructed from Gainesville to I-495 to provide limited-access general purpose express lanes that would operate eastbound in the morning and westbound in the evening. |

The following alternative elements were recommended not to be carried forward:

- *Alternative Element 8 - North-South Route 28 LRT*
  Provide LRT service along Route 28 between Dulles Airport and Manassas.

- *Alternative Element 9 - North-South Route 28 HOV*
  Provide continuous-access HOV lanes in the Route 28 corridor between Dulles Airport and Manassas with separate HOV ramps at the I-66/Route 28 interchange.

- *Alternative Element 10 - Route 50 HOV*
  Provide continuous-access HOV lanes in the Route 50 corridor between I-66 and Route 28 with separate HOV ramps at the I-66/Route 50 interchange.

Alternative Elements 8 and 9 were eliminated because they are not consistent with the east/west travel focus for this study and because County policies require that a separate corridor study be performed on Route 28. Evaluation of Alternative Element 10 will be temporarily deferred until a later stage in the study. However, if travel demand forecasts indicate a need to reconsider these alternative elements, then any one of these alternative elements could be reexamined.

The approach to evaluating the fifteen single-mode alternative elements is to forecast travel on a subset of the fifteen single-mode elements, and then to extrapolate the data to other related alternatives. Generally, the forecast will be completed on the "maximum" alternative element, and the output data would then be used to evaluate the smaller components comprising the maximum alternative element. At the same time, those alternative elements that have been defined to serve identical or similar travel patterns which are characterized by major modal differences (i.e. Light Rail Transit versus Metrorail) can also be compared in terms of their effectiveness. Table 3 summarizes the seven (7) travel demand model applications which were completed as the basis for the Screen 1B evaluation of the fifteen defined alternative elements.

Credible highway and transit forecasts cannot be produced for several of the fifteen single-mode alternative elements until the Northern Virginia MIS Regional Travel Model incorporating the Dulles Transit Study methodology is available for the "expanded" regional cordon boundary area. Therefore, travel demand forecasts for the following alternative elements will not be produced during Screen 1B, even though these elements were retained at the conclusion of Screen 1A:

- *Alternative Element 3B - HOV Extension along Route 29 to Route 15;*
- *Alternative Element 5 - VRE Extension to Gainesville/Haymarket;* and
- *Alternative Element 7A2 - Metrorail Extension to Gainesville.*

Given the location of the "old" external cordon line and the structure of the traffic analysis zone system in Prince William County, the results generated by the proposed limited number of travel demand model applications will not, in and of themselves, support a definitive decision to retain or delete these alternative elements in Screen 1B. As a result, these untested elements will be retained and incorporated into the multi-modal alternatives formulated for evaluation in Screen 2.

## TABLE 3
## RECOMMENDED TRAVEL DEMAND MODEL APPLICATIONS - SCREEN 1B

| TRAVEL DEMAND MODEL APPLICATION | ALTERNATIVES TO BE MODELED (FOR EVALUATION OF NOTED ELEMENTS) | RATIONALE |
|---|---|---|
| 1 | 1 - Baseline Scenario | Base 2020 assignment to adopted CLRP highway and transit networks; basis of comparison for all future travel demand model applications. |
| 2 | 2 - Enhanced Baseline Scenario | Assessment of most reasonable TSM/TDM/ITS/Bus Transit System Improvements over next 20-25 years; required for FTA definition of "new" transit trips. |
| 3 | 3C - Barrier Separated HOV to Gainesville (3A, 3B, and 3C) | Most reasonable maximum HOV system; allows for determination of entry/exit terminus points for barrier separated HOV facility (aka Shirley Highway). Results for 3B may not be conclusive due to location near "old" regional cordon line boundary. |
| 4 | 4C - Improvements to I-66, U.S. Route 29 and U.S. Route 50 (4A, 4B, 4C, and 11) | Most reasonable maximum change to CLRP highway plan; allows for determination of the ability of highway improvements to alleviate congestion in I-66 corridor; critical input to development of required I-66/I-495 interchange improvements. |
| 5 | 6C - LRT to Both Manassas and Route 50/28 (6A, 6B, 6C) | Most reasonable maximum LRT system in I-66 corridor; allows for determination of transit ridership potential in Route 50/28 corridor. Allows for direct comparison to basic Metrorail options. |
| 6 | 7A1 - Metrorail to Centreville (7A1, 7A2 - Metrorail Extension to Gainesville, and 7B) | Maximum Metrorail system extension in I-66 corridor currently envisioned on local comprehensive plans; provides guidance on station locations. Allows for direct comparison to LRT options. Extension past Centreville to Gainesville area cannot yet be fully and fairly examined due to location of terminus near "old" regional cordon line boundary. |
| 7 | 7B - Metrorail Route 50/28 (7A1, 7A2, and 7B) | Allows for direct comparison to *Alt. 6A - LRT Route 50/28* and provides information necessary to determine whether the I-66 or the U.S. Route 50 corridor is the more appropriate direction to extend Metrorail service beyond I-66/U.S. Route 50 interchange. |

The alternative elements selected for travel demand modeling in Screen 1B were refined to define roadway and transit system characteristics to be used in the modeling. This refinement process included workshops with the project Technical Advisory Committee (TAC) and a review of key assumptions with the project Policy Advisory Committee (PAC). Following is a more detailed description of the characteristics of each of the alternative elements modeled. Details of the bus transit system defined for each alternative are in Appendix 1.

## BASELINE SCENARIO

### HIGHWAY NETWORK

Existing
\+ Constrained Long Range Plan (July 1995 CLRP)

\+ Proffered roadway improvements as specified by Fairfax and Prince William Counties

NOTES:
1. Does not include projects identified for "study"
2. "Disney" related improvements will not be included:
   - I-66 Interchange 1 mile west of U.S. 15
   - Heathcote Drive, Antioch Road to U.S. 15
   - Heathcote Drive interchange with Connector Road
   - Heathcote Drive, U.S. 15 to U.S. 29

### TRANSIT NETWORK

1990 Transit Network from Dulles Model

\+ VRE with service enhancements from VRE projected budgets provided by NVTC

\+ CLRP Related Transit Improvements (August 1995 COG Transit Network Development for FY96-01 TOP/CLRP AOC Analysis)

\+ Consultant recommended bus transit routes associated with Stringfellow Park and Ride

\+ Western Fairfax VRE Station - Located east of the Town of Clifton; no feeder bus service; unconstrained parking

NOTES:
1. Dulles Rail will not be included in Screen 1B (Not a CLRP Project)
2. Version 5.2 Land Use will be used for Screen 1B

## ENHANCED BASELINE SCENARIO

HIGHWAY NETWORK

Baseline Scenario

NOTES: The Baseline Scenario includes significant roadway enhancements as specified in the July 1995 CLRP. No additional roadway enhancements are proposed as part of the Enhanced Baseline Scenario.

TRANSIT NETWORK

Baseline Scenario

+ Selected bus route additions/modifications/enhancements as identified in:
  - August 1994 NVTC Study of Coordinating and Integrating Northern Virginia's Interjurisdictional Bus Routes
  - COG PFT2 Intensive Transit Network (1992)
  - Fairfax County Plans
  - Prince William County Plans
  - Other

+ ITS Local Bus Route Deviations
+ Parking Facility Variable Message Signs
+ Increased (unconstrained) parking at Vienna and Dunn Loring Metrorail stations
+ Additional Elements as Identified through analysis of Baseline Scenario Travel Forecast.

## ALTERNATIVE 3C - Barrier Separated HOV

HIGHWAY NETWORK

Baseline Scenario

+ Barrier Separated reversible HOV Lanes (2)

+ Existing Concurrent HOV Lanes are removed (Future Cross-section is 3 SOV+2 HOV)

+ HOV Interchange Locations (to/from the east):

I-495 (to/from north and south)
Monument Drive (both east and west)
Stone Road
Rt. 28
Slip Ramp East of 234
Slip Ramp East of Rt. 28 Bypass
Vienna Metro Station (to/from the west)
Stringfellow Road
Rt. 29 (Gainesville)
Rt. 50

NOTE: 1. Stone Road HOV access includes Stone Rd/New Braddock connection
2. All existing highway access points will remain

TRANSIT NETWORK

Enhanced Baseline Scenario with modifications to maximize bus use of the HOV lanes.

## ALTERNATIVE 4C - Improvements to I-66, Rt. 29, Rt. 50

HIGHWAY NETWORK

Baseline Scenario

+ Add 1 SOV to I-66 from Rt. 29 (Centreville) to I-495 (4 SOV + 1 HOV)
+ Six Lanes on Rt. 50 and Rt. 29 from I-495 to Rt. 28
+ Grade Separations at:

Blake Lane/Rt. 50
Rt. 123/Rt. 50
Waples Mill Rd./Rt. 50
Forum Drive/Rt. 29
Walney Rd./Rt. 50
Rt. 28/New Braddock
Fairfax Circle
Kamp Washington (Rt. 29/Rt. 50)
Waples Mill Rd./Rt. 29
Clifton Rd./Rt. 29
Stringfellow Rd./Rt. 50

TRANSIT NETWORK

Enhanced Baseline Scenario

## ALTERNATIVE 6C - LRT to Both Manassas and Rt. 50/Rt. 28

HIGHWAY NETWORK

Baseline Scenario with selected improvements for station access

TRANSIT NETWORK

Enhanced Baseline Scenario

+ LRT to Manassas via Rt. 29 and Rt. 28 with stations at:
  - Fairfax Circle
  - Kamp Washington
  - Fairfax Co. Pkwy.
  - Compton
  - Manassas Park
  - Yorkshire
  - Chain Bridge
  - Government Center
  - Centreville
  - Manassas Park Drive
  - Vienna

+ LRT via I-66 to Fairfax Co. Pkwy to Rt. 50 to Rt. 28 with stations at:
  - Vienna
  - Fair Oaks
  - Fair Lakes North
  - Chantilly East
  - Smithsonian
  - Dulles Corners
  - Vicinity of Rt. 123
  - Fair Lakes East
  - Greenbriar
  - Chantilly West
  - McLearen Road
  - Dulles Airport

+ Modifications to focus feeder bus service on LRT station sites

LRT Headways - Each Line Match Metrorail with timed transfers

Station Parking - Unconstrained

Parking Cost - $1.00

Train Capacity - Unconstrained

Base Fare - Existing WMATA Fare Structure

Transfer Policy - No cost for transfer

## ALTERNATIVE 7A1 - Metrorail Extension to Centreville

HIGHWAY NETWORK

Baseline Scenario with selected improvements for station access

TRANSIT NETWORK

Enhanced Baseline Scenario

\+ Metrorail Extension to Centreville with stations located at:

- Vicinity of Rt. 123
- Fair Oaks Mall
- Stringfellow Road
- Centreville

\+ Modifications to focus feeder bus service on new Metro station sites

NOTE: 1. Centreville Station will include Stone Road/New Braddock Road connection

Headways - Same as existing

Station Parking - Unconstrained

Parking Costs - Same as existing ($2.25 in Fairfax Co.)

Train Capacity - Unconstrained

Base Fare - Existing WMATA Fare Structure

Transfer Policy - Same as today

## ALTERNATIVE 7B - Metrorail Extension to Rt. 50/Rt. 28

<u>HIGHWAY NETWORK</u>

Baseline Scenario with selected improvements for station access

+ Grade separations on Rt. 50 from Fairfax County Parkway to Centreville Road

<u>TRANSIT NETWORK</u>

Enhanced Baseline Scenario

+ Metrorail Extension to Rt. 50/Rt. 28 with stations located at:
    - Vicinity of Rt. 123
    - Fair Oaks Mall
    - Greenbriar
    - Chantilly
    - Smithsonian
    - McLearen Rd.
    - Dulles Airport

+ Modifications to focus feeder bus service on new Metro station sites

<u>Headways</u> - Same as existing

<u>Station Parking</u> - Unconstrained

<u>Parking Costs</u> - Same as existing ($2.25 in Fairfax Co.)

<u>Train Capacity</u> - Unconstrained

<u>Base Fare</u> - Existing WMATA Fare Structure

<u>Transfer Policy</u> - Same as today

## 4.3 TRAVEL DEMAND FORECAST RESULTS

The results of the Screen 1B travel demand forecasting are displayed in the following tables and graphics. The results are analyzed in Section 5.0 and conclusions and recommendations are presented in Section 6.0.

As an overview of the travel forecasts, Year 2020 average daily traffic volume forecasts are presented at the 39 study area locations shown on Figure 4. Table 4 displays the forecast traffic volumes in comparison to the most recent traffic count (1994/95).

### 4.3.1 Travel Mode Split

One of the measures of effectiveness selected for Screen 1B is the overall corridor travel mode split. The travel mode split is calculated in terms of "linked" trips by travel mode. The concept of "linked" trips is illustrated in Figure 5. Basically, a trip between a single origin and a single destination is counted as one trip regardless of the number of travel modes used. The trip is classified by travel mode according to the following hierarchy:

- Metrorail/LRT
- Commuter Rail
- Bus
- HOV
- SOV

The resulting travel mode split of trips with at least one end (either the production end, the attraction end or both) in the I-66 Corridor MIS study area is shown in Table 5. There are slight (less than 0.3%) differences in the total number of person trips in the study area by project alternative. This is a result of the increased accessibility of the corridor associated with all alternatives relative to the Baseline Scenario. While the overall number of trip productions and attractions in the study area remains approximately constant for all alternatives, increased accessibility results in somewhat longer trips. Therefore, a corridor-to-corridor trip in the Baseline Scenario (1 Production in study area, 1 Attraction in study area, 1 Trip) may be replaced by a corridor-to-region trip and a region-to-corridor trip (1 Production in study area , 1 Attraction in study area, 2 Trips).

Table 5N is comparable to Table 5 but includes trips in an expanded area consisting of all of Northern Virginia. The total person trip differences among alternatives in the Northern Virginia area are substantially less than the differences in the I-66 Corridor MIS study area.

Table 5W is also comparable to Table 5 but documents home-based work trips only.

### 4.3.2 Travel Time

Another measure of effectiveness selected for Screen 1B is travel time. This measure is addressed by calculating travel times by transit, single occupant vehicle (SOV) and high occupant vehicle (HOV-2+) between representative origin and destination pairs for each alternative element. The origins and destinations selected for this analysis are shown in Figure 6.

Year 2020 transit travel times are shown in Table 6A. SOV travel times are in Table 6B and HOV travel times are in Table 6C.

### 4.3.3 Roadway Level of Service

Another measure of effectiveness selected for Screen 1B is roadway level of service. This measure is addressed based on year 2020 PM peak hour traffic volume forecasts, calculated volume to capacity (V/C) ratios, and miles of roadway forecast to operate at level of service (LOS) F in the year 2020.

Table 7 contains V/C ratios in the PM peak hour, peak direction along eleven screenlines through the project study area. The screenline locations are shown in Figure 7. Detailed screenline volumes and V/C ratios by facility are included in Appendix 2. The V/C's are calculated based on LOS E operations and the capacity relationships by facility type documented in the regional travel model.

Table 8 documents the miles of roadway facility forecast to operate at LOS F in the PM peak hour in the year 2020. Facilities forecast to operate at LOS F under the Baseline Scenario are illustrated in Figure 8. Note that the miles of certain facility types change by alternative to reflect roadway additions/improvements associated with each alternative element.

### 4.3.4 Reverse Commute Trips Served

This measure of effectiveness is addressed by calculating the number of transit trip between various transit markets. For purposes of this analysis, the I-66 Corridor MIS study area has been divided into three segments as illustrated in Figure 9. A reverse commute trip is defined as one with a production end in the District, Maryland, or Northern Virginia inside the Beltway and an attraction end in the corridor study area. Year 2020 transit commuting trips are shown in Table 9. Home-based work transit commuting trips are shown in Table 9W.

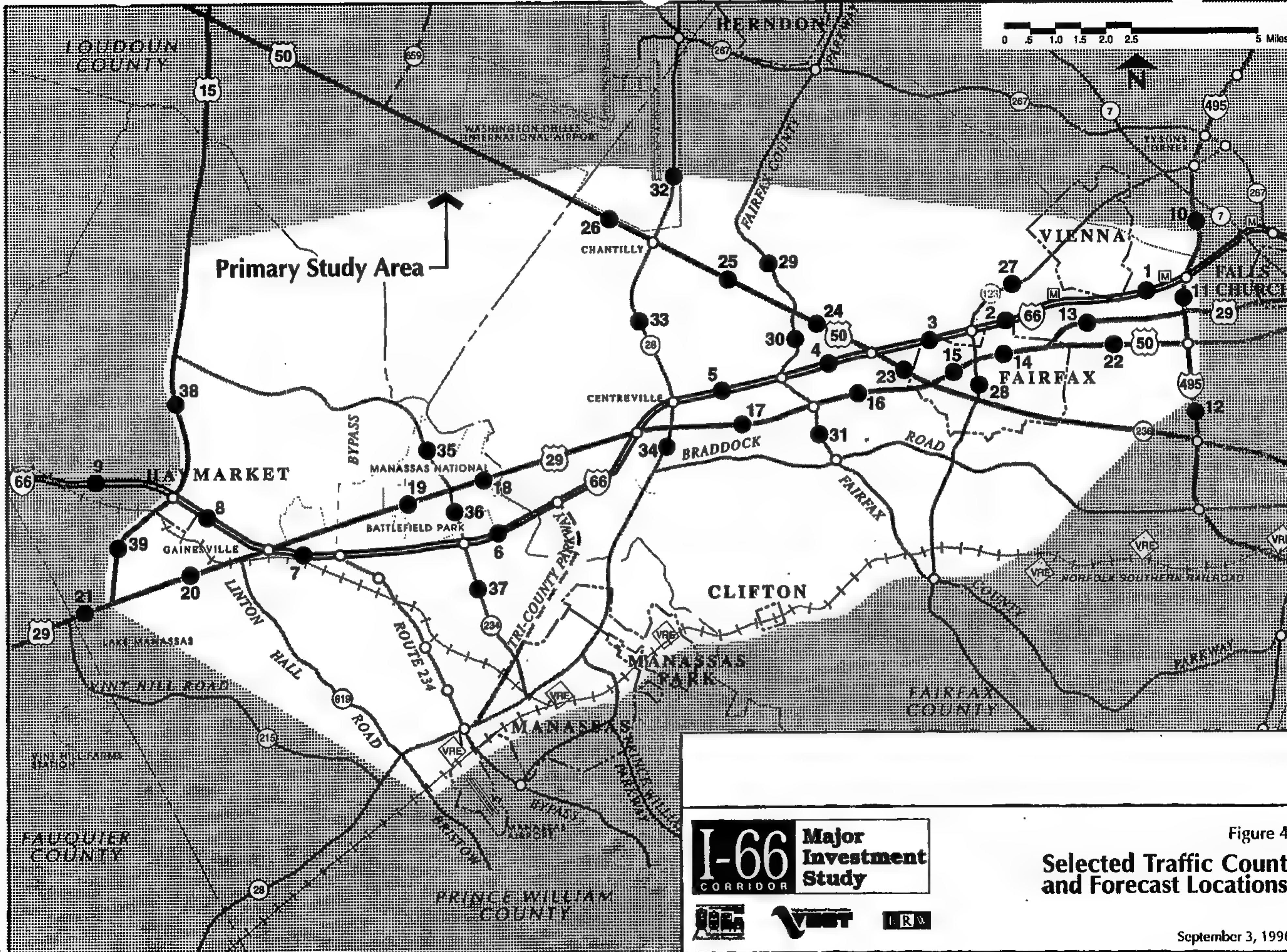
### 4.3.5 Transit Ridership by Mode

Transit ridership by mode is calculated in terms of "unlinked" trips as illustrated in Figure 10. Under this definition, a single trip between an origin and a destination may be counted as a number of "unlinked" trips depending on the travel modes and transfers required. Transit trips by submode are shown in Table 10. Home-based work transit trips by submode are shown in Table 10W.

Additional measures of transit usage particularly for fixed-rail systems are station boardings and total ridership. Estimated total daily proposed rail station boardings in the year 2020 are shown in Table 11. Total daily ridership in the Year 2020 on each of the proposed rail lines is shown in Table 12. Rail line loadings at selected locations are shown in Table 12A.

### 4.3.6 Roadway Vehicle Miles of Travel, Hours of Travel, and Hours of Delay

Table 13 documents vehicle miles of travel (VMT), vehicle hours of travel (VHT) and vehicle hours of delay on roadways within the I-66 Corridor MIS study area. These same measures are calculated for an expanded study area including all of Northern Virginia in Table 13N.




I-66 CORRIDOR Major Investment Study

Figure 4

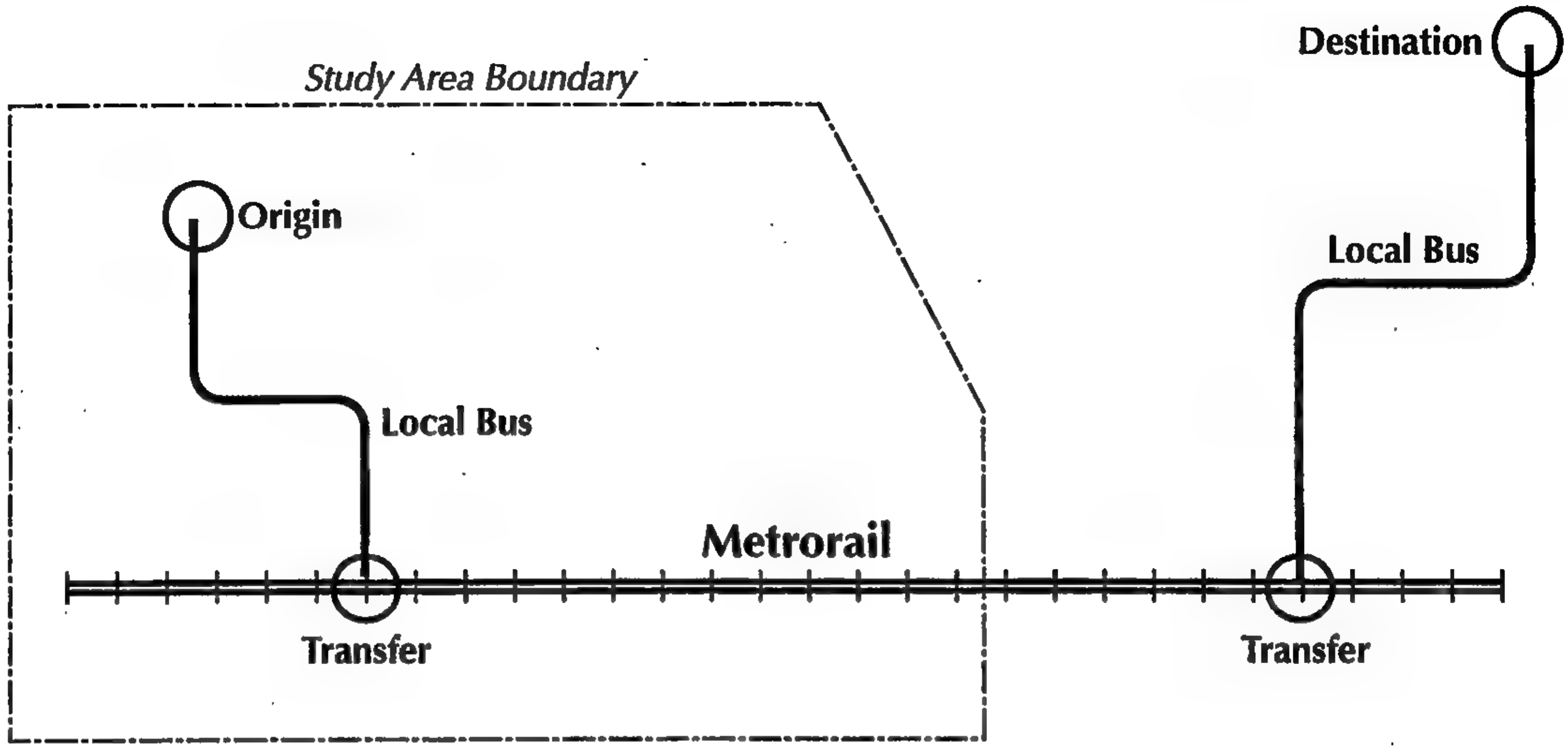
## Selected Traffic Count and Forecast Locations

September 3, 1996

**TABLE 4**
**EXISTING (1994/95) AND 2020 FORECASTS OF DAILY VEHICLE VOLUMES AT SELECTED LOCATIONS FOR THE SCREEN 1B ALTERNATIVES**

| LOCATION # | | | 1994/95 COUNT | 2020 FORECAST 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | I-66 | E of Nutley | 189,000 | 177,000 | 176,800 | 185,800 | 222,200 | 176,000 | 176,600 | 176,100 |
| 2 | | E of 123 | 159,000 | 180,600 | 180,500 | 189,500 | 233,700 | 179,900 | 180,400 | 180,400 |
| 3 | | E of 50 | 150,000 | 185,000 | 184,000 | 193,400 | 219,300 | 184,200 | 184,600 | 184,600 |
| 4 | | E of FCP | 92,000 | 177,800 | 177,100 | 185,900 | 184,600 | 177,300 | 177,100 | 174,400 |
| 5 | | E of 28 | 88,000 | 180,100 | 179,200 | 185,700 | 182,700 | 180,000 | 178,300 | 176,300 |
| 6 | | E of 234 | 82,000 | 122,500 | 122,300 | 124,200 | 127,800 | 121,900 | 123,200 | 122,000 |
| 7 | | E of Gainesville | 51,000 | 127,500 | 126,800 | 125,900 | 128,300 | 126,900 | 125,700 | 126,100 |
| 8 | | E of 15 | 28,000 | 101,200 | 100,800 | 100,400 | 101,600 | 101,000 | 100,500 | 100,900 |
| 9 | | W of 15 | 26,000 | 28,700 | 28,700 | 28,700 | 28,700 | 28,700 | 28,700 | 28,700 |
| 10 | Beltway | N of 66 | 194,000 | 267,300 | 266,500 | 267,200 | 274,000 | 266,200 | 266,400 | 268,200 |
| 11 | | S of 66 | 194,000 | 235,800 | 235,900 | 236,200 | 243,200 | 235,200 | 235,000 | 237,500 |
| 12 | | S of 50 | 192,000 | 239,500 | 239,100 | 238,800 | 237,700 | 237,500 | 238,000 | 240,100 |
| 13 | US-29 | E of FF Circle | 30,000 | 95,700 | 95,200 | 94,100 | 97,900 | 93,900 | 95,100 | 95,300 |
| 14 | | E of 123 | 31,400 | 108,600 | 108,300 | 108,300 | 116,000 | 108,200 | 108,600 | 108,500 |
| 15 | | W of 123 | 26,000 | 71,400 | 71,200 | 71,600 | 130,000 | 71,300 | 71,300 | 71,100 |
| 16 | | E of FCP | 39,000 | 45,100 | 44,700 | 44,800 | 88,400 | 44,800 | 45,000 | 44,600 |
| 17 | | E of 28 | 39,000 | 35,800 | 35,400 | 35,300 | 74,200 | 35,100 | 36,000 | 34,700 |
| 18 | | E of 234 | 9,100 | 34,400 | 34,100 | 33,500 | 35,500 | 34,300 | 33,800 | 34,600 |
| 19 | | W of 234 | 9,100 | 19,600 | 19,700 | 19,600 | 19,700 | 19,600 | 20,000 | 20,200 |
| 20 | | E of 15 | 34,000 | 42,800 | 42,700 | 42,800 | 43,100 | 42,800 | 42,700 | 42,800 |
| 21 | | W of 15 | 34,000 | 44,800 | 44,800 | 44,800 | 44,800 | 44,800 | 44,800 | 44,800 |
| 22 | US-50 | E of FF Circle | 51,000 | 112,100 | 112,000 | 112,300 | 112,500 | 111,800 | 111,500 | 111,500 |
| 23 | | S of 66 | 53,000 | 112,900 | 113,100 | 112,800 | 131,100 | 112,700 | 111,800 | 112,800 |
| 24 | | N of 66 | 60,000 | 117,700 | 117,200 | 116,800 | 160,400 | 117,100 | 117,100 | 120,200 |
| 25 | | W of FCP | 48,000 | 90,500 | 90,300 | 89,200 | 123,700 | 90,500 | 90,000 | 126,900 |
| 26 | | W of 28 | 16,000 | 53,500 | 53,200 | 52,400 | 58,200 | 53,100 | 52,700 | 56,800 |
| 27 | SR-123 | N of 66 | 49,000 | 56,800 | 56,400 | 56,700 | 64,400 | 57,300 | 57,300 | 56,500 |
| 28 | | S of 29/50 | 26,400 | 34,900 | 34,700 | 34,600 | 33,600 | 34,700 | 34,600 | 34,800 |
| 29 | FCP | N of 50 | 27,800 | 75,100 | 74,900 | 75,400 | 78,000 | 74,600 | 75,000 | 59,800 |
| 30 | | N of 66 | 23,200 | 92,100 | 92,000 | 91,700 | 88,000 | 91,700 | 91,500 | 92,500 |
| 31 | | S of 29 | 0 | 125,300 | 124,800 | 122,800 | 131,500 | 122,700 | 122,300 | 126,900 |
| 32 | SR-28 | N of 50 | 36,000 | 52,200 | 52,400 | 51,100 | 51,300 | 51,000 | 51,400 | 52,200 |
| 33 | | N of 66 | 28,000 | 44,400 | 44,600 | 40,700 | 42,600 | 42,900 | 40,400 | 41,200 |
| 34 | | S of 29 | 45,000 | 49,200 | 48,100 | 38,500 | 48,300 | 47,900 | 38,900 | 48,500 |
| 35 | SR-234 | N of 29 | 8,000 | 24,100 | 24,400 | 25,100 | 24,500 | 24,200 | 25,200 | 24,200 |
| 36 | | N of 66 | 11,000 | 34,800 | 34,700 | 32,500 | 35,000 | 34,800 | 32,500 | 34,400 |
| 37 | | S of 66 | 44,000 | 57,800 | 57,900 | 58,200 | 58,600 | 57,500 | 57,800 | 57,800 |
| 38 | US-15 | N of 66 | 9,200 | 51,000 | 50,800 | 50,300 | 51,300 | 50,700 | 50,100 | 50,800 |
| 39 | | S of 66 | 7,700 | 27,300 | 27,500 | 27,300 | 27,200 | 27,300 | 27,400 | 27,300 |

14-Aug-96




| | |
|---|---|
| Linked Trips | 1 |
| Local Bus Trips | 0 |
| Metrorail Trips | 1 |
| Walk Trips | 0 |

Note: Linked trips are recorded according to the following modal priority:

Metrorail/LRT
Commuter Rail
Express Bus
Local Bus

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Figure 5

**Definitions of "Trips" as Used in Table -5**

September 17, 1996

## TABLE 5
## 2020 DAILY PERSON TRIPS (LINKED) BY MODE IN STUDY AREA

| MODE | NUMBER OF PERSON TRIPS BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Bus Only | 40,000 | 60,000 | 60,000 | 57,000 | 28,000 | 39,000 | 38,000 |
| Rail | 59,000 | 63,000 | 64,000 | 64,000 | 119,000 | 107,000 | 98,000 |
| SUBTOTAL TRANSIT | 99,000 | 123,000 | 124,000 | 121,000 | 147,000 | 146,000 | 136,000 |
| SOV | 1,492,000 | 1,481,000 | 1,469,000 | 1,497,000 | 1,464,000 | 1,468,000 | 1,473,000 |
| HOV-2 | 475,000 | 472,000 | 482,000 | 473,000 | 470,000 | 471,000 | 470,000 |
| HOV-3+ | 351,000 | 349,000 | 351,000 | 347,000 | 348,000 | 348,000 | 348,000 |
| SUBTOTAL ROADWAY | 2,318,000 | 2,302,000 | 2,302,000 | 2,317,000 | 2,282,000 | 2,287,000 | 2,291,000 |
| WALK/BIKE/TAXI | 156,000 | 152,000 | 152,000 | 145,000 | 152,000 | 151,000 | 151,000 |
| TOTAL PERSON TRIPS | 2,573,000 | 2,577,000 | 2,578,000 | 2,583,000 | 2,581,000 | 2,584,000 | 2,578,000 |
| CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Total Transit | - | - | 1,000 | (2,000) | 24,000 | 23,000 | 13,000 |
| Total Roadway | - | - | 0 | 15,000 | (20,000) | (15,000) | (11,000) |
| Total Person | - | - | 1,000 | 6,000 | 4,000 | 7,000 | 1,000 |
| % CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Total Transit | - | - | 0.35% | -2.04% | 18.56% | 17.80% | 10.46% |
| Total Roadway | - | - | 0.03% | 0.73% | -0.85% | -0.61% | -0.43% |
| Total Person | - | - | 0.05% | 0.28% | 0.12% | 0.29% | 0.10% |

NOTE: The values in this table only include trips with an origin or destination in the I-66 Corridor Study Area.

## TABLE 5N
## 2020 DAILY PERSON TRIPS (LINKED) BY MODE IN NORTHERN VIRGINIA

| | NUMBER OF PERSON TRIPS BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| MODE | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Bus Only | 250,000 | 271,000 | 271,000 | 268,000 | 237,000 | 253,000 | 248,000 |
| Rail | 434,000 | 438,000 | 438,000 | 439,000 | 501,000 | 486,000 | 480,000 |
| SUBTOTAL TRANSIT | 684,000 | 709,000 | 709,000 | 707,000 | 738,000 | 739,000 | 728,000 |
| SOV | 4,876,000 | 4,863,000 | 4,846,000 | 4,877,000 | 4,844,000 | 4,845,000 | 4,849,000 |
| HOV-2 | 1,625,000 | 1,621,000 | 1,636,000 | 1,623,000 | 1,617,000 | 1,618,000 | 1,618,000 |
| HOV-3+ | 1,233,000 | 1,230,000 | 1,232,000 | 1,226,000 | 1,228,000 | 1,228,000 | 1,228,000 |
| SUBTOTAL ROADWAY | 7,734,000 | 7,714,000 | 7,714,000 | 7,726,000 | 7,689,000 | 7,691,000 | 7,695,000 |
| WALK/BIKE/TAXI | 732,000 | 728,000 | 728,000 | 720,000 | 728,000 | 724,000 | 727,000 |
| TOTAL PERSON TRIPS | 9,150,000 | 9,151,000 | 9,151,000 | 9,153,000 | 9,155,000 | 9,154,000 | 9,150,000 |
| CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Total Transit | - | - | 0 | (2,000) | 29,000 | 30,000 | 19,000 |
| Total Roadway | - | - | 0 | 12,000 | (25,000) | (23,000) | (19,000) |
| Total Person | - | - | 0 | 2,000 | 4,000 | 3,000 | (1,000) |
| % CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Total Transit | - | - | -0.06% | -0.46% | 3.97% | 4.03% | 2.61% |
| Total Roadway | - | - | 0.01% | 0.16% | -0.33% | -0.29% | -0.24% |
| Total Person | - | - | 0.00% | 0.01% | 0.04% | 0.03% | -0.00% |

NOTE: The values in this table only include trips with an origin or destination in Northern Virginia

## TABLE 5W
## 2020 DAILY HOME BASED WORK PERSON TRIPS (LINKED) BY MODE IN STUDY AREA

| MODE | NUMBER OF HOME BASED WORK PERSON TRIPS BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Bus Only | 20,000 | 30,000 | 30,000 | 28,000 | 14,000 | 18,000 | 20,000 |
| Rail | 31,000 | 33,000 | 34,000 | 34,000 | 70,000 | 64,000 | 57,000 |
| SUBTOTAL TRANSIT | 51,000 | 63,000 | 64,000 | 62,000 | 84,000 | 82,000 | 77,000 |
| SOV | 467,000 | 460,000 | 449,000 | 468,000 | 445,000 | 447,000 | 451,000 |
| HOV-2 | 70,000 | 68,000 | 77,000 | 66,000 | 65,000 | 65,000 | 66,000 |
| HOV-3+ | 38,000 | 37,000 | 39,000 | 34,000 | 36,000 | 36,000 | 36,000 |
| SUBTOTAL ROADWAY | 575,000 | 565,000 | 565,000 | 568,000 | 546,000 | 548,000 | 553,000 |
| WALK/BIKE/TAXI | 11,000 | 10,000 | 10,000 | 9,000 | 10,000 | 10,000 | 10,000 |
| TOTAL PERSON TRIPS | 637,000 | 638,000 | 639,000 | 639,000 | 640,000 | 640,000 | 640,000 |
| CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Total Transit | - | - | 1,000 | (1,000) | 21,000 | 19,000 | 14,000 |
| Total Roadway | - | - | 0 | 3,000 | (19,000) | (17,000) | (12,000) |
| Total Person | - | - | 1,000 | 1,000 | 2,000 | 2,000 | 2,000 |
| % CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Total Transit | - | - | 1.91% | -1.66% | 35.27% | 32.10% | 22.20% |
| Total Roadway | - | - | 0.06% | 0.70% | -3.35% | -2.96% | -2.03% |
| Total Person | - | - | 0.21% | 0.30% | 0.43% | 0.49% | 0.33% |

NOTE: The values in this table only include home based work trips with an origin or destination in the I-66 Corridor Study Area.

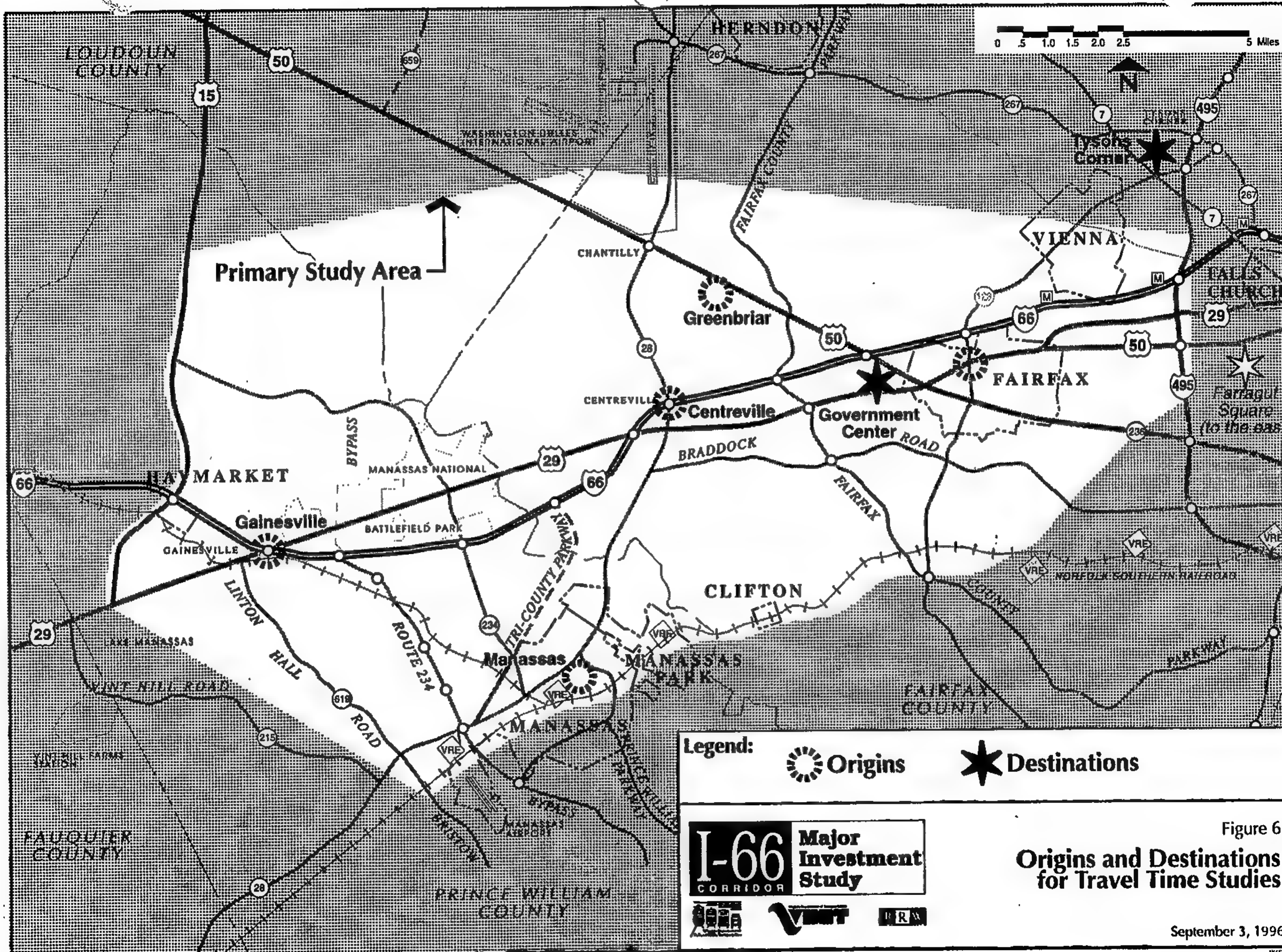


Figure 6

**Origins and Destinations for Travel Time Studies**

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## TABLE 6A
## 2020 TRANSIT TRAVEL TIMES

| ORIGIN | DESTINATION | TRAVEL TIME (MINUTES) BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Gainesville | Tysons | * | 83 | 66 | 82 | 97 | 88 | 90 |
| | Govt Center | * | 58 | 49 | 58 | 46 | 47 | 46 |
| | Farragut Sq | * | 91 | 74 | 90 | 86 | 81 | 83 |
| Manassas | Tysons | 89 | 77 | 60 | 77 | ** | 82 | 85 |
| | Govt Center | 85 | 72 | 72 | 71 | 60 | 41 | 41 |
| | Farragut Sq | 83 | 85 | 74 | 85 | 90 | 75 | 78 |
| Centreville | Tysons | 81 | 74 | 58 | 65 | 64 | 65 | 74 |
| | Govt Center | 42 | 37 | 37 | 36 | 27 | 24 | 30 |
| | Farragut Sq | 75 | 75 | 60 | 66 | 57 | 58 | 67 |
| Greenbriar | Tysons | 79 | 71 | 66 | 66 | 76 | 65 | 65 |
| | Govt Center | 26 | 26 | 26 | 22 | 25 | 25 | 24 |
| | Farragut Sq | 72 | 72 | 67 | 67 | 62 | 58 | 58 |
| Fairfax City | Tysons | 62 | 58 | 58 | 58 | 62 | 62 | 62 |
| | Govt Center | 39 | 31 | 31 | 30 | 31 | 31 | 31 |
| | Farragut Sq | 52 | 52 | 52 | 52 | 56 | 56 | 56 |
| TOTAL COMPOSITE TRAVEL TIME | | NA | 962 | 850 | 925 | NA | 858 | 890 |

*There is no local bus service from Gainesville under the Baseline Scenario.

**No transit trips are assigned between Manassas and Tysons under Alternative 6C because of the number of transfers required.

**TABLE 6B**
**2020 SOV TRAVEL TIMES**

| | | TRAVEL TIME (MINUTES) BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ORIGIN | DESTINATION | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Gainesville | Tysons | 69 | 69 | 69 | 51 | 69 | 69 | 69 |
| | Govt Center | 36 | 36 | 36 | 31 | 36 | 36 | 36 |
| | Farragut Sq | 102 | 102 | 102 | 83 | 102 | 102 | 102 |
| Manassas | Tysons | 64 | 64 | 64 | 46 | 64 | 64 | 64 |
| | Govt Center | 32 | 32 | 32 | 26 | 32 | 32 | 32 |
| | Farragut Sq | 97 | 97 | 97 | 79 | 97 | 97 | 97 |
| Centreville | Tysons | 49 | 49 | 49 | 33 | 49 | 49 | 49 |
| | Govt Center | 14 | 14 | 14 | 13 | 14 | 14 | 14 |
| | Farragut Sq | 82 | 82 | 82 | 65 | 82 | 82 | 82 |
| Greenbriar | Tysons | 44 | 44 | 44 | 36 | 44 | 44 | 44 |
| | Govt Center | 13 | 13 | 13 | 11 | 13 | 13 | 12 |
| | Farragut Sq | 82 | 82 | 82 | 68 | 82 | 82 | 81 |
| Fairfax City | Tysons | 32 | 32 | 32 | 29 | 32 | 32 | 32 |
| | Govt Center | 14 | 14 | 14 | 10 | 14 | 14 | 14 |
| | Farragut Sq | 65 | 65 | 65 | 62 | 65 | 65 | 65 |
| TOTAL COMPOSITE TRAVEL TIME | | 795 | 795 | 795 | 643 | 795 | 795 | 793 |

## TABLE 6C
## 2020 HOV TRAVEL TIMES

| ORIGIN | DESTINATION | TRAVEL TIME (MINUTES) BY ALTERNATIVE: 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|---|
| Gainesville | Tysons | 65 | 65 | 46 | 50 | 65 | 65 | 65 |
| | Govt Center | 35 | 35 | 27 | 30 | 35 | 35 | 35 |
| | Farragut Sq | 82 | 82 | 67 | 71 | 82 | 82 | 82 |
| Manassas | Tysons | 61 | 61 | 41 | 46 | 61 | 61 | 61 |
| | Govt Center | 31 | 31 | 23 | 26 | 31 | 31 | 31 |
| | Farragut Sq | 67 | 67 | 63 | 67 | 67 | 67 | 67 |
| Centreville | Tysons | 48 | 48 | 30 | 33 | 48 | 48 | 48 |
| | Govt Center | 14 | 14 | 11 | 13 | 14 | 14 | 14 |
| | Farragut Sq | 64 | 64 | 51 | 54 | 64 | 64 | 64 |
| Greenbriar | Tysons | 44 | 44 | 32 | 36 | 44 | 44 | 44 |
| | Govt Center | 13 | 13 | 13 | 11 | 13 | 13 | 12 |
| | Farragut Sq | 68 | 68 | 53 | 57 | 68 | 68 | 68 |
| Fairfax City | Tysons | 32 | 32 | 32 | 29 | 32 | 32 | 32 |
| | Govt Center | 14 | 14 | 14 | 10 | 14 | 14 | 14 |
| | Farragut Sq | 51 | 51 | 51 | 51 | 51 | 51 | 51 |
| TOTAL COMPOSITE TRAVEL TIME | | 689 | 689 | 554 | 584 | 689 | 689 | 688 |

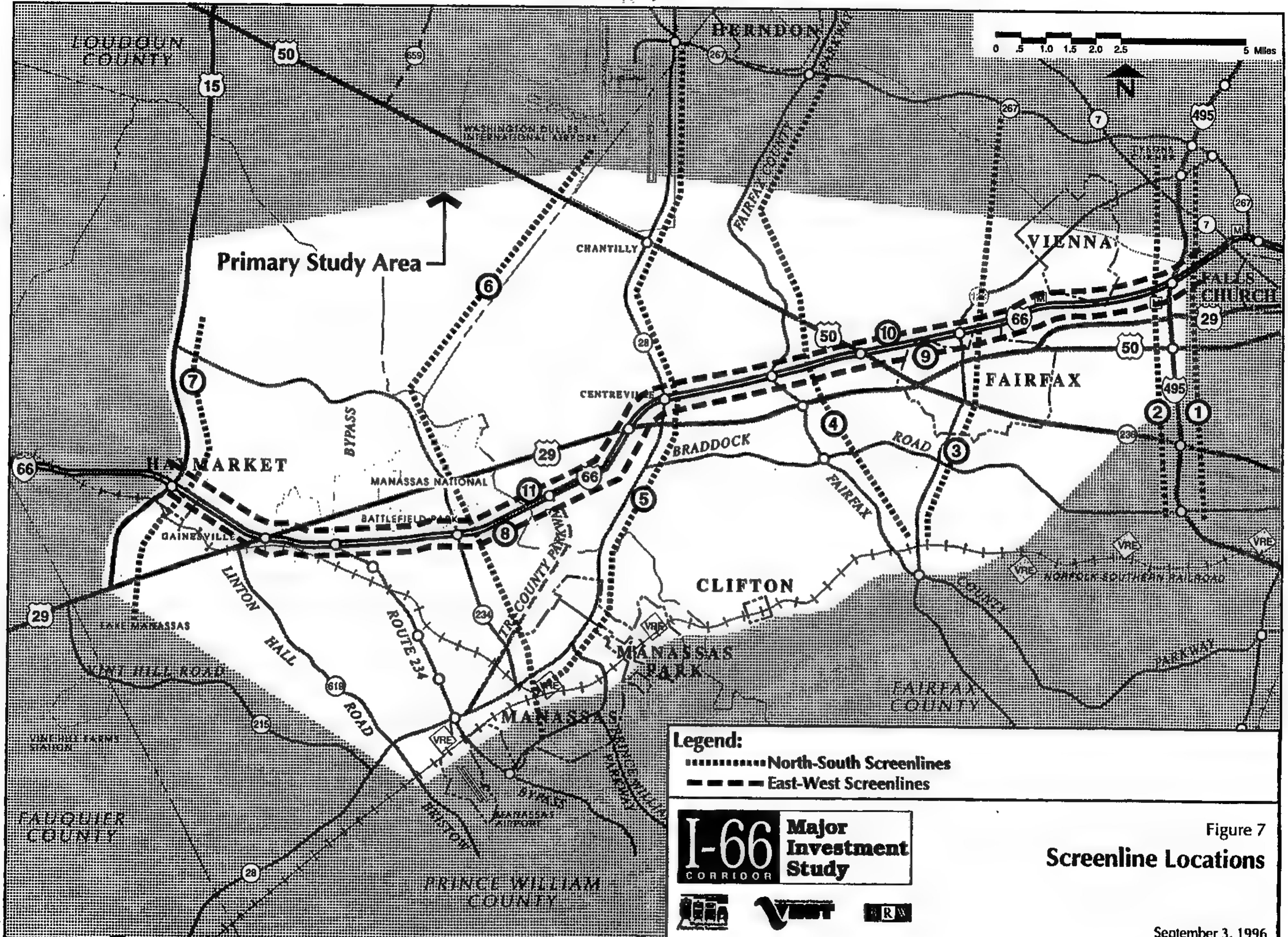
NOTE: (1) The Alternative 3C Barrier Separated HOV lanes provide a substantial time savings and an additional HOV lane over the existing concurrent HOV lanes modeled as part of the Baseline and Enhanced Baseline alternatives.

## TABLE 7
## 2020 SCREENLINE PM PEAK HOUR/PEAK DIRECTION VOLUME/CAPACITY (LOS E) RATIOS

| | V/C BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| **NORTH/SOUTH SCREENLINE LOCATION** | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| 1 Inside I-495 | 1.44 | 1.44 | 1.45 | 1.49 | 1.43 | 1.44 | 1.44 |
| 2 Outside I-495 | 1.55 | 1.55 | 1.52 | 1.54 | 1.54 | 1.54 | 1.55 |
| 3 Hunter Mill/123 East | 1.19 | 1.18 | 1.16 | 1.25 | 1.18 | 1.18 | 1.18 |
| 4 Fairfax County Parkway | 1.14 | 1.12 | 1.09 | 1.08 | 1.11 | 1.10 | 1.14 |
| 5 VA 28 | 1.12 | 1.12 | 1.07 | 1.03 | 1.10 | 1.10 | 1.11 |
| 6 Loudoun/VA 234 | 0.98 | 0.97 | 0.91 | 1.02 | 0.97 | 0.98 | 0.97 |
| 7 US 15 | 0.67 | 0.66 | 0.68 | 0.68 | 0.67 | 0.67 | 0.67 |
| **EAST/WEST SCREENLINE LOCATION** | | | | | | | |
| 8 I-66 North/West End | 1.24 | 1.23 | 1.12 | 1.24 | 1.24 | 1.13 | 1.23 |
| 9 I-66 North/East End | 1.28 | 1.29 | 1.30 | 1.36 | 1.28 | 1.27 | 1.29 |
| 10 I-66 South/West End | 0.94 | 0.94 | 0.91 | 0.96 | 0.93 | 0.90 | 0.93 |
| 11 I-66 South/East End | 1.10 | 1.11 | 1.10 | 1.14 | 1.09 | 1.09 | 1.11 |

NOTES:

(1) The increased capacity and resultant travel times associated with Alternative 4C attracts additional traffic to the I-66 Corridor resulting in little change in forecast V/C
(2) Refer to Appendix for V/C ratios by facility and direction
(3) Previous versions of this Table presented bi-directional V/C ratios over the full PM peak period, resulting in lower values
(4) The screenlines shown have been slightly re-arranged from those in previous versions of this Table, in order to be consistent with the presentation of detailed results in the Appendix




Legend:

- North-South Screenlines
- East-West Screenlines

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Figure 7

**Screenline Locations**

September 3, 1996

**TABLE 8**

**2020 PM PEAK HOUR LEVEL OF SERVICE ON STUDY AREA ROADWAY SYSTEM**

| | TOTAL DIRECTIONAL MILES OF FACILITY BY TYPE | | | | | | |
|---|---|---|---|---|---|---|---|
| FACILITY TYPE | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Freeway | 134 | 134 | 132 | 134 | 134 | 134 | 140 |
| Expwy/Pkwy | 15 | 15 | 15 | 43 | 15 | 15 | 15 |
| Major Arterial | 91 | 91 | 91 | 63 | 91 | 91 | 85 |
| Other Coded Roadways | 622 | 622 | 624 | 622 | 622 | 624 | 622 |

| | DIRECTIONAL MILES OF FACILITY WITH LOS F BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| FACILITY TYPE | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Freeway | 39 | 36 | 37 | 35 | 36 | 36 | 37 |
| Expwy/Pkwy | 6 | 6 | 7 | 16 | 7 | 6 | 5 |
| Major Arterial | 38 | 38 | 35 | 32 | 38 | 35 | 39 |
| Other Coded Roadways | 166 | 165 | 158 | 156 | 163 | 157 | 160 |

| | PERCENTAGE OF DIRECTIONAL MILES WITH LOS F BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| FACILITY TYPE | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Freeway | 28.9% | 27.2% | 28.3% | 26.3% | 27.0% | 27.2% | 26.8% |
| Expwy/Pkwy | 39.9% | 39.9% | 43.8% | 36.8% | 50.1% | 39.9% | 35.8% |
| Major Arterial | 42.0% | 41.5% | 39.0% | 49.9% | 41.4% | 38.6% | 46.1% |
| Other Coded Roadways | 26.7% | 26.6% | 25.3% | 25.0% | 26.2% | 25.1% | 25.8% |

Notes:

(1) Alternatives 3C and 7A include the Stone/Braddock Connector as an "Other Coded Roadway"
(2) In Alternative 4C, portions of US-50 is an Expressway/Parkway, not a Major Arterial
(3) In Alternative 7B, portions of US-50 is a Freeway, not a Major Arterial


Figure 8

**Facilities Operating at LOS F**
**(V/C >1.0) 2020 PM Peak Hour-Baseline Scenario**

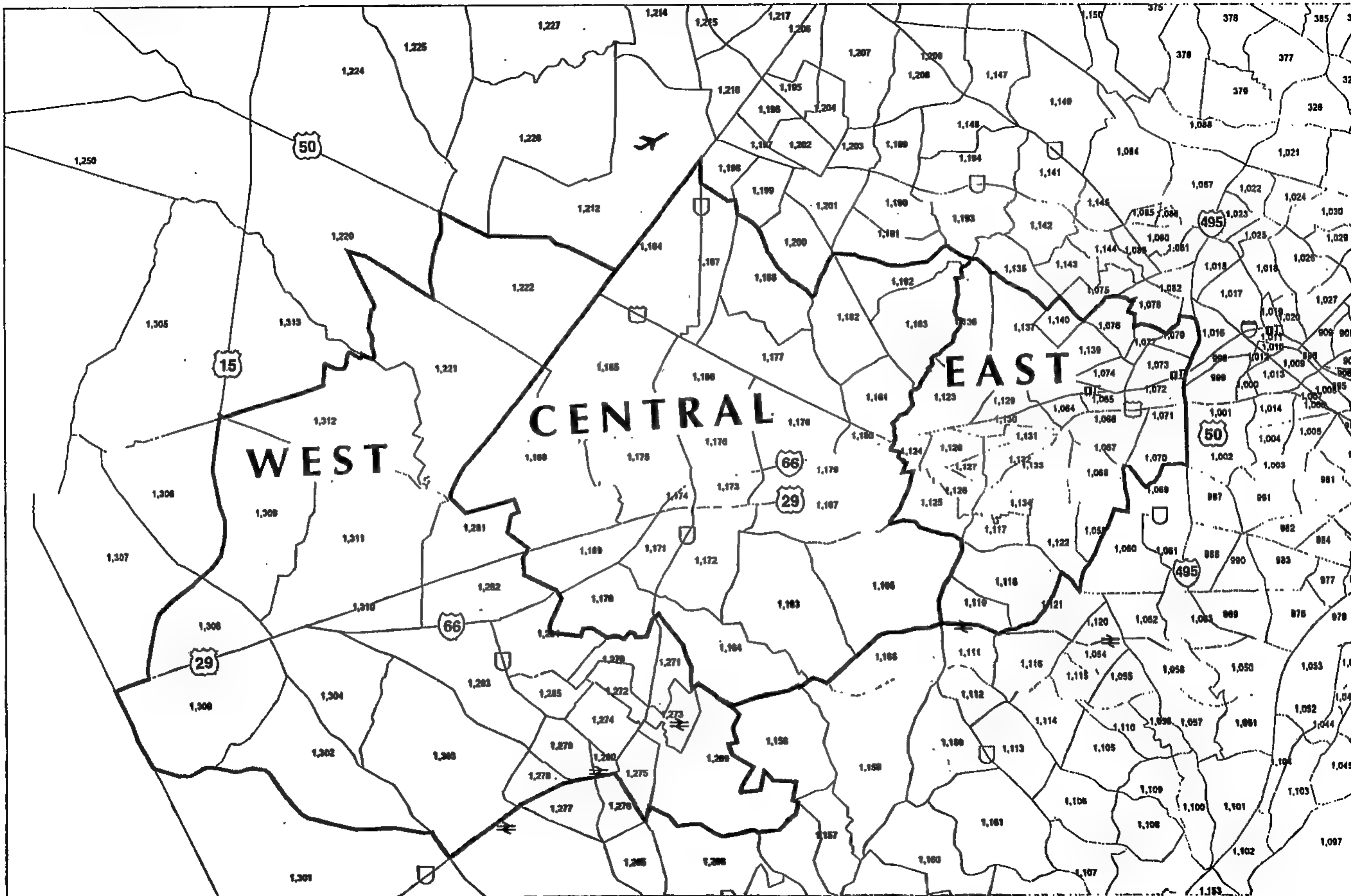



Figure 9
**Corridor Subareas for Table-9**

## TABLE 9
## 2020 TRANSIT MARKETS (COMMUTE TRIPS)

| FROM SUBAREA | TO SUBAREA | NUMBER OF TRANSIT TRIPS BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| West Corridor | Regional Core | 1,200 | 1,600 | 1,800 | 1,700 | 3,500 | 2,400 | 1,900 |
| Central Corridor | Regional Core | 6,900 | 10,200 | 10,700 | 10,400 | 18,900 | 19,700 | 16,200 |
| East Corridor | Regional Core | 14,400 | 14,500 | 14,400 | 14,400 | 16,000 | 15,800 | 15,800 |
| West Corridor | Rest of Region | 1,600 | 2,300 | 2,500 | 2,300 | 3,700 | 2,900 | 2,600 |
| Central Corridor | Rest of Region | 7,800 | 10,200 | 10,600 | 9,900 | 13,900 | 15,000 | 13,700 |
| East Corridor | Rest of Region | 10,800 | 11,500 | 11,400 | 11,400 | 12,000 | 12,300 | 12,200 |
| Corridor | Corridor | 4,700 | 6,800 | 7,000 | 6,100 | 9,900 | 7,800 | 7,100 |
| Reverse Commute | Corridor | 7,500 | 8,600 | 8,600 | 8,300 | 10,900 | 10,800 | 10,300 |
| Rest of NoVA | Corridor | 5,700 | 7,800 | 7,900 | 7,500 | 9,500 | 9,000 | 9,000 |
| Total Corridor | Regional Core | 22,500 | 26,300 | 26,900 | 26,500 | 38,400 | 37,900 | 33,900 |
| Total Corridor | Rest of Region | 20,200 | 24,000 | 24,500 | 23,600 | 29,600 | 30,200 | 28,500 |
| Total Corridor Destinations | | 17,900 | 23,200 | 23,500 | 21,900 | 30,300 | 27,600 | 26,400 |
| Total Corridor-Related | | 60,600 | 73,500 | 74,900 | 72,000 | 98,300 | 95,700 | 88,800 |
| Change from Enhanced Baseline | | - | - | 1,400 | (1,500) | 24,800 | 22,200 | 15,300 |
| % Change from Enhanced Baseline | | - | - | 2.1% | -1.9% | 33.9% | 30.3% | 20.9% |

Notes:

(1) All trips in production-attraction format. Therefore, a round trip for commuting from the east corridor to the regional core will be listed as two trips for that market.
(2) Commute trips defined to include home-based work trips, journey-to-work trips from other locations, and home-based university trips.
(3) Reverse commute trips defined as those having the production end in the District, Maryland, or Northern Virginia inside the Beltway, and t he attraction end in the corridor.
(4) The rest of Northern Virginia trips have the production end in those portions of Fairfax, Loudoun, and Prince William Counties outside the Beltway and outside the corridor (i.e., Reston, Springfield, Leesburg, Woodbridge, etc.).

## TABLE 9W
## 2020 TRANSIT MARKETS (HOME-BASED WORK TRIPS)

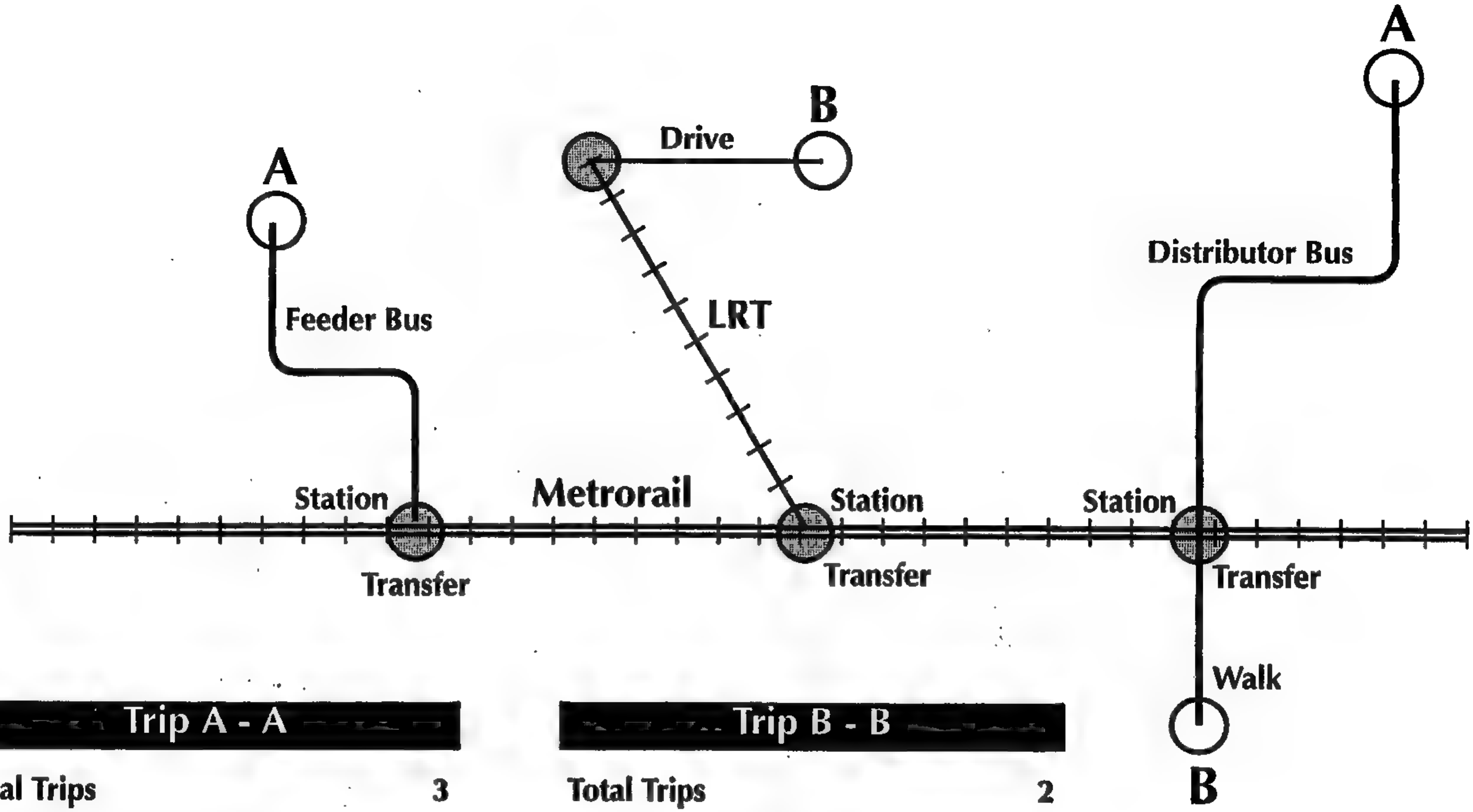
| FROM SUBAREA | TO SUBAREA | NUMBER OF HBW TRANSIT TRIPS BY ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| West Corridor | Regional Core | 1,200 | 1,500 | 1,700 | 1,600 | 3,200 | 2,300 | 1,800 |
| Central Corridor | Regional Core | 6,700 | 10,000 | 10,400 | 10,200 | 18,100 | 19,000 | 15,600 |
| East Corridor | Regional Core | 13,900 | 13,900 | 13,900 | 13,900 | 15,300 | 15,100 | 15,200 |
| West Corridor | Rest of Region | 1,400 | 2,000 | 2,200 | 2,000 | 3,200 | 2,500 | 2,300 |
| Central Corridor | Rest of Region | 6,600 | 8,600 | 8,900 | 8,400 | 12,300 | 13,200 | 12,000 |
| East Corridor | Rest of Region | 8,600 | 9,000 | 9,000 | 8,900 | 9,700 | 9,700 | 9,700 |
| Corridor | Corridor | 2,800 | 4,300 | 4,400 | 3,900 | 6,300 | 4,900 | 4,400 |
| Reverse Commute | Corridor | 5,900 | 7,000 | 7,000 | 6,600 | 9,000 | 8,800 | 8,300 |
| Rest of NoVA | Corridor | 4,200 | 6,100 | 6,100 | 5,900 | 7,300 | 6,800 | 6,900 |
| Total Corridor | Regional Core | 21,800 | 25,400 | 26,000 | 25,700 | 36,600 | 36,400 | 32,600 |
| Total Corridor | Rest of Region | 16,600 | 19,600 | 20,100 | 19,300 | 25,200 | 25,400 | 24,000 |
| Total Corridor Destinations | | 12,900 | 17,400 | 17,500 | 16,400 | 22,600 | 20,500 | 19,600 |
| Total Corridor-Related | | 51,300 | 62,400 | 63,600 | 61,400 | 84,400 | 82,300 | 76,200 |
| Change from Enhanced Baseline | | - | - | 1,200 | (1,000) | 22,000 | 19,900 | 13,800 |
| % Change from Enhanced Baseline | | - | - | 1.9% | -1.7% | 35.0% | 31.9% | 22.1% |

Notes:

(1) All trips in production-attraction format. Therefore, a round trip for commuting from the east corridor to the regional core will be listed as two trips for that market.

(2) Reverse commute trips defined as those having the production end in the District, Maryland, or Northern Virginia inside the Beltway, and t he attraction end in the corridor.

(3) The rest of Northern Virginia trips have the production end in those portions of Fairfax, Loudoun, and Prince William Counties outside the Beltway and outside the corridor (i.e., Reston, Springfield, Leesburg, Woodbridge, etc.).




| Trip A - A | |
|---|---|
| Total Trips | 3 |
| Feeder Bus - Metrorail | 1 |
| Distributor Bus | 1 |
| Total Bus - Related | 2 |
| Total New & Metrorail Related | 1 |

| Trip B - B | |
|---|---|
| Total Trips | 2 |
| Auto Access - New Rail | 1 |
| Total New & Metrorail Related | 1 |

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Figure 10

**Definitions of "Trips" as Used in Table -10**

September 17, 1996

## TABLE 10
## 2020 DAILY TRANSIT TRIPS BY SUBMODE IN THE STUDY AREA

| MODE | NUMBER OF TRANSIT TRIPS | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Bus Only (Total) | 40,200 | 60,100 | 59,700 | 56,900 | 27,700 | 38,500 | 38,100 |
| Feeder Bus - Proposed Rail | 0 | 0 | 0 | 0 | 16,000 | 17,600 | 18,000 |
| Feeder Bus - Existing Rail | 22,400 | 25,200 | 26,200 | 23,300 | 8,300 | 8,800 | 10,400 |
| Auto Access - Proposed Rail | 0 | 0 | 0 | 0 | 34,200 | 34,700 | 23,800 |
| Auto Access - Existing Rail | 18,600 | 18,700 | 18,500 | 21,600 | 9,300 | 12,400 | 12,800 |
| Walk Access - All Rail | 2,800 | 2,800 | 2,800 | 2,700 | 20,800 | 8,400 | 8,100 |
| Existing Rail to Corridor | 15,200 | 16,500 | 16,500 | 16,300 | 29,900 | 24,900 | 25,100 |
| Distributor Bus | 15,700 | 17,500 | 17,600 | 17,200 | 20,700 | 25,500 | 22,800 |
| Total Bus-Related | 78,300 | 102,800 | 103,500 | 97,400 | 72,700 | 90,400 | 89,300 |
| Total Rail-Related | 59,000 | 63,200 | 64,000 | 63,900 | 118,500 | 106,800 | 98,200 |

Notes:

(1) Distributor Bus - A trip that uses a bus for distribution from a rail station to a final destination in the corridor
(2) Proposed Rail refers to eithre new Metrorail service associated with alternatives 7A or 7B or LRT service associated with Alternative 6C
(3) Only includes trips with an origin or destination in the corridor

# TABLE 10W
## 2020 DAILY HOME BASED WORK TRANSIT TRIPS BY SUBMODE IN THE STUDY AREA

| MODE | NUMBER OF HOME BASED WORK TRANSIT TRIPS | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Bus Only | 19,800 | 29,600 | 29,900 | 27,800 | 13,900 | 18,400 | 19,600 |
| Feeder Bus - Proposed Rail | 0 | 0 | 0 | 0 | 8,500 | 9,400 | 11,500 |
| Feeder Bus - Existing Rail | 13,000 | 14,200 | 15,100 | 12,500 | 4,200 | 4,100 | 4,300 |
| Auto Access - Proposed Rail | 0 | 0 | 0 | 0 | 24,900 | 26,600 | 16,800 |
| Auto Access - Existing Rail | 10,900 | 10,600 | 10,400 | 13,200 | 6,400 | 7,400 | 7,800 |
| Walk Access - All Rail | 2,100 | 2,100 | 2,100 | 2,100 | 13,800 | 6,300 | 5,700 |
| Existing Rail to Corridor | 5,400 | 5,900 | 6,000 | 5,800 | 12,600 | 10,200 | 10,400 |
| Distributor Bus | 5,000 | 5,700 | 5,700 | 5,500 | 7,800 | 9,600 | 8,200 |
| Total Bus-Related | 37,800 | 49,500 | 50,700 | 45,800 | 34,400 | 41,500 | 43,600 |
| Total Rail-Related | 31,400 | 32,800 | 33,600 | 33,600 | 70,400 | 64,000 | 56,500 |

Notes:

(1) Distributor Bus - A trip that uses a bus for distribution from a rail station to a final destination in the corridor
(2) Proposed Rail refers to eithre new Metrorail service associated with alternatives 7A or 7B or LRT service associated with Alternative 6C
(3) Only includes trips with an origin or destination in the corridor

## TABLE 11
## BOARDING SUMMARY FOR METRORAIL AND PROPOSED RAIL STATIONS
## 2020 TOTAL DAILY TRIPS

| | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,50,29 | 6C-LRT 50 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|
| Proposed Rail Stations | | | | | | | |
| Fairfax City/66 | - | - | - | - | 3,900 | 7,800 | 8,100 |
| Fair Oaks/66 | - | - | - | - | 5,400 | 12,500 | 10,700 |
| Stringfellow/66 | - | - | - | - | - | 11,600 | - |
| Centreville/66 | - | - | - | - | - | 16,400 | - |
| Greenbrier/50 | - | - | - | - | 6,400 | - | 11,400 |
| Chantilly/50 | - | - | - | - | - | - | 8,300 |
| Smithsonian | - | - | - | - | 600 | - | 1,500 |
| McLearen/28 | - | - | - | - | - | - | 4,300 |
| Fairfax Circle/50 | - | - | - | - | 3,800 | - | - |
| Fairfax/50 | - | - | - | - | 5,800 | - | - |
| Kamp Washington | - | - | - | - | 3,100 | - | - |
| Govt Center | - | - | - | - | 1,500 | - | - |
| Fairfax Pkwy/29 | - | - | - | - | 2,600 | - | - |
| Clifton Road/29 | - | - | - | - | 2,400 | - | - |
| Little Rocky Run | - | - | - | - | 1,800 | - | - |
| Centreville/29 | - | - | - | - | 8,200 | - | - |
| Compton/28 | - | - | - | - | 1,400 | - | - |
| Manassas Park | - | - | - | - | 1,600 | - | - |
| Manassas Park VRE | - | - | - | - | 3,600 | - | - |
| Fair Lakes East | - | - | - | - | 1,800 | - | - |
| Fair Lakes North | - | - | - | - | 3,400 | - | - |
| Chantilly East | - | - | - | - | 2,500 | - | - |
| Chantilly West | - | - | - | - | 2,800 | - | - |
| Dulles Corner | - | - | - | - | 5,400 | - | - |
| Dulles | - | - | - | - | 2,600 | - | 4,800 |
| Subtotal South Alignment | - | - | - | - | 35,800 | 48,300 | - |
| Subtotal North Alignment | - | - | - | - | 34,800 | - | 49,100 |
| Existing Metrorail Stations | | | | | | | |
| Vienna | 26,100 | 28,600 | 29,200 | 29,300 | 13,800 | 13,600 | 15,100 |
| Dunn Loring | 9,700 | 9,700 | 9,700 | 9,700 | 10,600 | 14,100 | 11,200 |
| West Falls Church | 17,100 | 17,100 | 17,000 | 17,000 | 18,700 | 19,800 | 18,100 |
| Subtotal | 52,900 | 55,400 | 55,900 | 56,000 | 43,100 | 47,500 | 44,400 |
| TOTAL | 52,900 | 55,400 | 55,900 | 56,000 | 113,700 | 95,800 | 93,500 |

Note: Data reflects daily boardings or alightings; does not include transfers

# TABLE 12
# RIDERHIP SUMMARY FOR PROPOSED RAIL LINES
# 2020 TOTAL DAILY TRIPS

| | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,50,29 | 6C-LRT 50 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|
| South Alignment | - | - | - | - | 63,700 | - | 89,700 |
| North Alignment | - | - | - | - | 59,400 | 92,800 | - |
| Subtotal | - | - | - | - | 123,100 | 92,800 | 89,700 |
| Transfers | - | - | - | - | 5,900 | - | - |
| Total less Transfers | - | - | - | - | 117,200 | 92,800 | 89,700 |

## TABLE 12A
## RAIL LINE LOADINGS AT SELECTED LOCATIONS

| | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|
| Into Vienna: I-66 | | | | | | | |
| AM Peak Hour Inbound | NA | NA | NA | NA | 4,400 | 9,200 | 8,000 |
| AM Peak Hour Outbound | NA | NA | NA | NA | 2,200 | 2,700 | 2,800 |
| Daily | NA | NA | NA | NA | 38,100 | 67,000 | 62,600 |
| Into Vienna: Nutley | | | | | | | |
| AM Peak Hour Inbound | NA | NA | NA | NA | 6,400 | NA | NA |
| AM Peak Hour Outbound | NA | NA | NA | NA | 1,300 | NA | NA |
| Daily | NA | NA | NA | NA | 41,600 | NA | NA |
| Into West Falls Church | | | | | | | |
| AM Peak Hour Inbound | 6,900 | 7,100 | 7,300 | 7,400 | 13,100 | 12,200 | 11,300 |
| AM Peak Hour Outbound | 1,900 | 2,100 | 2,100 | 2,100 | 3,100 | 3,200 | 3,000 |
| Daily | 56,600 | 61,800 | 62,900 | 60,200 | 87,100 | 86,300 | 81,100 |
| Into Ballston | | | | | | | |
| AM Peak Hour Inbound | 12,300 | 12,500 | 12,700 | 12,800 | 16,900 | 16,200 | 15,000 |
| AM Peak Hour Outbound | 3,600 | 3,800 | 3,800 | 3,700 | 3,900 | 3,900 | 3,900 |
| Daily | 106,200 | 111,400 | 112,200 | 109,600 | 120,000 | 117,100 | 112,500 |
| Into Rosslyn | | | | | | | |
| AM Peak Hour Inbound | 17,600 | 17,800 | 17,900 | 18,000 | 22,000 | 21,200 | 20,200 |
| AM Peak Hour Outbound | 6,800 | 6,900 | 6,900 | 6,800 | 7,200 | 7,100 | 7,100 |
| Daily | 160,000 | 163,200 | 163,500 | 161,800 | 176,900 | 172,600 | 168,100 |

**TABLE 13**
**2020 DAILY VEHICLE MILES, VEHICLE HOURS, AND DELAY IN THE I-66 STUDY AREA**

| | ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| CHARACTERISTIC | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Daily Vehicle Miles of Travel | 16,900,000 | 16,846,000 | 16,885,000 | 17,578,000 | 16,750,000 | 16,792,000 | 16,852,000 |
| Daily Vehicle Hours of Travel | 444,000 | 441,000 | 437,000 | 448,000 | 436,000 | 437,000 | 439,000 |
| Daily Vehicle Hours of Delay | 69,000 | 67,000 | 64,000 | 67,000 | 65,000 | 65,000 | 67,000 |
| CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Daily Vehicle Miles of Travel | - | - | 39,000 | 732,000 | (96,000) | (54,000) | 6,000 |
| Daily Vehicle Hours of Travel | - | - | (4,000) | 7,000 | (5,000) | (4,000) | (2,000) |
| Daily Vehicle Hours of Delay | - | - | (3,000) | 0 | (2,000) | (2,000) | 0 |
| PERCENT CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Daily Vehicle Miles of Travel | - | - | 0.2% | 4.3% | -0.6% | -0.3% | 0.0% |
| Daily Vehicle Hours of Travel | - | - | -0.8% | 1.6% | -1.1% | -0.9% | -0.4% |
| Daily Vehicle Hours of Delay | - | - | -5.4% | -0.4% | -4.1% | -3.9% | -0.4% |

Note:

(1) Vehicle hours of delay estimated by multiplying total vehicles by link by the difference between peak period and off-peak period travel times
(2) Values computed only for highway links located primarily in the I-66 Study Area

## TABLE 13N

## 2020 DAILY VEHICLE MILES, VEHICLE HOURS, AND DELAY IN NORTHERN VIRGINIA

| | ALTERNATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| CHARACTERISTIC | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Daily Vehicle Miles of Travel | 68,629,000 | 68,461,000 | 68,309,000 | 68,809,000 | 68,135,000 | 68,201,000 | 68,247,000 |
| Daily Vehicle Hours of Travel | 1,941,000 | 1,930,000 | 1,917,000 | 1,926,000 | 1,914,000 | 1,916,000 | 1,920,000 |
| Daily Vehicle Hours of Delay | 420,000 | 413,000 | 404,000 | 410,000 | 405,000 | 405,000 | 409,000 |
| CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Daily Vehicle Miles of Travel | - | - | (152,000) | 348,000 | (326,000) | (260,000) | (214,000) |
| Daily Vehicle Hours of Travel | - | - | (13,000) | (4,000) | (16,000) | (14,000) | (10,000) |
| Daily Vehicle Hours of Delay | - | - | (9,000) | (3,000) | (8,000) | (8,000) | (4,000) |
| PERCENT CHANGE FROM ENHANCED BASELINE | | | | | | | |
| Daily Vehicle Miles of Travel | - | - | -0.2% | 0.5% | -0.5% | -0.4% | -0.3% |
| Daily Vehicle Hours of Travel | - | - | -0.7% | -0.2% | -0.8% | -0.7% | -0.5% |
| Daily Vehicle Hours of Delay | - | - | -2.0% | -0.6% | -1.9% | -1.9% | -0.9% |

Note:

(1) Vehicle hours of delay estimated by multiplying total vehicles by link by the difference between peak period and off-peak period travel times

(2) Values computed only for highway links located primarily in Northern Virginia

# 5.0 ANALYSIS OF ALTERNATIVES

## 5.1 ENHANCED BASELINE SCENARIO

### 5.1.2 Travel Demand Analysis of Alternative

Following are a number of observations regarding the travel demand characteristics associated with the Enhanced Baseline Scenario relative to the Baseline Scenario. As described in Section 4.2, the highway network associated with the Enhanced Baseline Scenario is identical to that defined in the Baseline Scenario. The Enhanced Baseline Scenario includes significant bus system additions, modifications and enhancements and additional parking at the Vienna and Dunn Loring Metrorail stations.

- The bus system improvements associated with the Enhanced Baseline Scenario (and assumed as part of each of the other elements) result in an increase of approximately 24 percent in all modes (bus and rail) of transit usage in the I-66 Corridor MIS study area (Table 5) relative to the Baseline Scenario.

- The Enhanced Baseline Scenario increases rail ridership in the I-66 Corridor MIS study area by approximately 4,000 trips per day (Tables 5 and 10).

- The Enhanced Baseline Scenario has no significant impact on roadway level of service in the study area (Tables 7 and 8).

- The Enhanced Baseline Scenario results in a 21 percent increase in transit related commute (work and university) trips (Table 9) and a 31 percent increase in bus related trips (Table 10) relative to the Baseline Scenario.

- The Enhanced Baseline Scenario results in a decrease of 54,000 VMT (-0.3%), 3,000 VHT (-0.7%) and 2,000 hours of delay (-3.0%) in the I-66 Corridor MIS study area relative to the Baseline Scenario (Table 13).

### 5.1.2 Conclusion

The Enhanced Baseline Scenario should continue to be analyzed as a component of each alternative element and as the base of comparison for the other alternative elements.

## 5.2 ALTERNATIVE 3C - BARRIER SEPARATED HOV

### 5.2.1 Travel Demand Analysis of Alternative

- Barrier separated HOV results in approximately 12,000 additional HOV trips per day (+1.6%) throughout the study area relative to the Enhanced Baseline Scenario (Table 5).

- The barrier separated HOV lanes offer a composite transit travel time savings of over 11 percent and a composite HOV travel time savings of almost 20 percent relative to the Enhanced Baseline Scenario (Tables 6A and 6C).

- The barrier separated HOV lanes have no significant impact on roadway level of service in the study area (Tables 7 and 8).

- The barrier separated HOV lanes result in a 2.1 percent increase in transit related commute trips (Table 9) relative to the Enhanced Baseline Scenario.

- The (3 hour) PM peak period, peak direction HOV demand exceeds 11,000 vehicles. The capacity of a concurrent HOV lane is approximately 1,800 to 2,000 vehicles per hour. Therefore, the forecast HOV-2+ travel demand in the corridor exceeds the capacity of the existing concurrent flow HOV lane during peak periods.

- The barrier separated HOV lanes result in an increase of 39,000 VMT (+0.2%), but a decrease of 4,000 VHT (-0.8%) and 3,000 hours of delay (-5.4%) in the I-66 Corridor MIS study area relative to the Enhanced Baseline Scenario (Table 13).

### 5.2.2 Conclusion

The forecast HOV-2+ travel demand in the corridor exceeds the capacity of the existing concurrent flow HOV lane during peak periods. Therefore, it is recommended that the barrier separated HOV (Alternative 3C) be retained for further analysis while the HOV facility enhancements (Alternative 3A) not be carried forward into Screen 2. An evaluation of HOV-3+ travel demand should be conducted as part of Screen 2.

### 5.2.3 Transportation Implications Beyond the I-66 Corridor

With more than one barrier separated HOV lane in the I-66 corridor, additional facilities to accommodate eastbound HOV's in the morning peak period at the Capital Beltway (I-495) may be required. HOV lanes on the Beltway are included in the CLRP and also in the analysis of the I-66 alternative elements. While this analysis assumed HOV-2+, the magnitude of the travel demand is likely to warrant HOV-3+ in the near future.

## 5.3 ALTERNATIVE 4C - IMPROVEMENTS TO I-66, ROUTE 29 AND ROUTE 50

### 5.3.1 Travel Demand Analysis of Alternative

- With improvements to I-66, Rt. 50 and Rt. 29, year 2020 daily transit ridership decreases by 2,000 person trips (-2.0 percent) and roadway usage increases by 15,000 person trips (+ 0.7 percent) in the I-66 Corridor MIS study area (Table 5) relative to the Enhanced Baseline Scenario.

- There is a small (-4 percent) decrease in transit travel times, a 19 percent decrease in SOV travel times and a 15 percent decrease in HOV travel times associated with the roadway improvement alternative element (Table 6A, 6B, 6C).

- The roadway improvements have no significant impact on roadway level of service in the study area (Tables 7 and 8). Travel demand in the study area fully utilizes the incremental capacity provided.

- The roadway improvements result in a 1.9 percent decrease in transit related commute trips (Table 9) relative to the Enhanced Baseline Scenario.

- The improvements to I-66, Rt. 50 and Rt. 29 result in an increase of 732,000 VMT (+4.3%) and 7,000 VHT (+1.6%) in the I-66 Corridor MIS study area relative to the Enhanced Baseline Scenario (Table 13).

### 5.3.2 Conclusion

Travel demand in the corridor fully utilizes both the incremental freeway and arterial capacity provided by this alternative. Therefore, this alternative should be retained for analysis in Screen 2.

### 5.3.3 Transportation Implications Beyond the I-66 Corridor

The addition of SOV lanes to I-66 may require additional SOV lanes on the Capital Beltway which are not currently in the CLRP. As long as I-66 east of the Beltway remains as an HOV only facility during peak hours in the peak direction, all eastbound SOV's in the morning peak period will have to exit at the Beltway.

## 5.4 ALTERNATIVE 6C - LRT TO BOTH MANASSAS AND ROUTE 50/28

### 5.4.1 Travel Demand Analysis of Alternatives

Summarized below are the major travel demand characteristics of the alternatives:

- The Alternative 6A LRT alignment from the Vienna Metrorail station to Dulles attracted 59,400 daily trips (Table 12).
- The Alternative 6B LRT alignment from the Vienna Metrorail station to Manassas attracted 63,700 daily trips (Table 12).
- The comparison of these two LRT lines with other LRT systems in North America is shown in Table 14. The riders per route mile compare very favorably with other built systems.
- The Metrorail station boardings at the Vienna station drop to 13,800 from 26,100 in the Baseline; this indicates many of the riders are using the service to access Metro (Table 11).
- Alternative 6C results in the highest transit ridership (linked trips) in the I-66 corridor of 147,000 versus 99,000 linked transit trips in the Baseline (Table 5).
- Alternative 6C attracts the highest number of work trips on transit of all the alternatives tested (98,300 daily trips versus 60,600 in the Baseline) (Table 9).
- The LRT alignments have no significant impact on roadway level of service in the study area.
- Alternative 6C results in the lowest vehicular travel of all the alternatives; comparison to the Enhanced Baseline Scenario indicates the following:

| CHARACTERISTIC | CHANGE FROM ENHANCED BASELINE FOR ALTERNATIVE 6C |
|---|---|
| Daily Vehicle Miles of Travel | -96,000 |
| Daily Vehicle Hours of Travel | -5,000 |
| Daily Vehicle Hours of Delay | -2,000 |

### 5.4.2 Conclusion

Retain Alternatives 6A, 6B, and 6C because of the large transit ridership and the very favorable comparisons of ridership to other built systems.

## TABLE 14
## DATA FOR SELECTED U.S. LRT SYSTEMS

| City | Year of Opening | Length (miles) | Total Project Cost ($ million)[1] | Daily Patronage | Daily Passengers/ Route Mile | Capital Cost/Daily Passenger | Capital Cost Per Mile ($ million) |
|---|---|---|---|---|---|---|---|
| **Baltimore** | 1992 | 22.5 | $406 | 20,000 | 889 | $20,300 | $18.0 |
| **Buffalo** | 1985 | 6.5 | $792 | 29,900 | 4,600 | $26,488 | $121.8 |
| **Calgary** | 1981 | 18.2 | $758 | 114,500 | 6,291 | $6,620 | $41.6 |
| **Dallas** | 1996 | 20 | $840 | 35,000[2] | 1,750 | $24,000 | $42.0 |
| **Denver** | 1994 | 5.3 | $116.5 | 13,000 | 2,453 | $8,962 | $22.0 |
| **Edmonton** | 1978 | 8.6 | $430 | 36,000 | 4,186 | $11,944 | $50.0 |
| **Los Angeles (Blue Line)** | 1990 | 21.6 | $1,067 | 42,000 | 1,944 | $25,405 | $49.4 |
| **Pittsburgh** | 1987 | 22.5 | $738 | 29,000 | 1,289 | $25,448 | $32.8 |
| **Portland, OR (Stage 1)** | 1986 | 15.2 | $305 | 24,500 | 1,612 | $12,449 | $20.1 |
| **Sacramento** | 1987 | 18.3 | $241 | 24,300 | 1,328 | $9,918 | $13.2 |
| **San Diego (South Line)** | 1981 | 41.9 | $729 | 49,000 | 1,169 | $14,878 | $17.4 |
| **San Jose** | 1987 | 19.5 | $735 | 19,700 | 1,010 | $37,310 | $37.7 |
| **St. Louis** | 1993 | 18 | $380 | 40,000 | 2,222 | $9,500 | $21.1 |

## FORECAST FOR I-66 CORRIDOR MIS LRT ALTERNATIVES

| Alternative Element | Year of Opening | Length (miles) | Capital Cost ($ million) | Daily Patronage | Daily Passengers/ Route Mile | Capital Cost/Daily Passenger | Capital Cost Per Mile ($ million) |
|---|---|---|---|---|---|---|---|
| **6A - Route 28/50** | 2020 Forecast | 16 | $1,075[3] | 59,400 | 3,700 | $18,100 | $67.2 |
| **6B - Manassas** | 2020 Forecast | 16 | $1,055[3] | 63,700 | 3,950 | $16,700 | $65.9 |

[1] Adjusted to 1995 dollars with Federal Reserve Board and National Average C.P.I. Annual Rate of Inflation
[2] Forecast
[3] Includes bridge, ramp, roadway, rail and station costs; does not include right-of-way, relocation or utility work.

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### 5.4.3 Transportation Implications Beyond I-66 Corridor

The ability of the Metrorail system to accommodate the passengers fed by the LRT routes in terms of downstream capacity and platform capacity at the Vienna station needs to be determined.

## 5.5 ALTERNATIVE 7A - METRORAIL TO CENTREVILLE AND 7B - METRORAIL TO ROUTE 50/28

### 5.5.1 Travel Demand Analysis of Alternatives

Table 15 summarizes the major travel demand characteristics of the two alternatives relative to the Enhanced Baseline Scenario.

**TABLE 15**
**SUMMARY OF MAJOR TRAVEL DEMAND CHARACTERISTICS OF ALTERNATIVES 7A AND 7B**

| STUDY AREA CHARACTERISTIC (Year 2020) | ALTERNATIVE 7A (Centreville) | ALTERNATIVE 7B (Route 50/28) | ENHANCED BASELINE |
|---|---|---|---|
| Total Daily Trips on Extension (Table 12) | 92,800 | 89,700 | N.A. |
| Station Boardings on Extension (Table 11) | 48,300 | 49,100 | N.A. |
| Station Boardings on Existing Metro (Table 11) | 47,500 | 44,400 | 55,400 |
| Total Station Boardings (Table 11) | 95,800 | 93,500 | 55,400 |
| Total Rail Linked Trips (Table 5) | 107,000 | 98,000 | 63,000 |
| Total (all modes) Linked Transit Trips (Table 5) | 146,000 | 136,000 | 123,000 |
| Transit Work Trips (Table 9) | 95,700 | 88,800 | 73,500 |
| Daily VMT Change from Enhanced Baseline (Table 13) | -54,000 | 6,000 | BASE |
| Daily VHT Change from Enhanced Baseline (Table 13) | -4,000 | -2,000 | BASE |
| Daily VHD Change from Enhanced Baseline (Table 13) | -2,000 | 0 | BASE |
| Reverse Commute Transit Work Trips (Table 9) | 10,800 | 10,300 | 8,600 |

Table 16 documents additional characteristics of the two alternatives and compares them relative to patronage by route length and capital cost.

**TABLE 16**
**SUMMARY OF ADDITIONAL CHARACTERISTICS OF ALTERNATIVES 7A AND 7B**

| CHARACTERISTIC OF ALTERNATIVE | ALTERNATIVE 7A (Centreville) | ALTERNATIVE 7B (Route 50/28) |
|---|---|---|
| Length of Extension (Miles) | 11 | 17 |
| Number of New Stations | 4 | 7 |
| Capital Cost ($ millions)* | $510 | $1,190 |
| Daily Patronage (Table 12) | 92,800 | 89,700 |
| Daily Passengers per Route Mile | 8,436 | 5,276 |
| Capital Cost Per Daily Passenger | $5,496 | $13,266 |
| Capital Cost Per Mile ($ millions) | $46.4 | $70.0 |

* Includes bridge, ramp, roadway, rail and station costs; does not include right-of-way, relocations or utilities.

- The Metrorail Alternatives have no significant impact on roadway level of service in the study area.

### 5.5.2 Conclusions

Alternative 7A, the Metrorail extension to Centreville offers significant advantages over Alternative 7B, the Metrorail extension to Route 50/28. While forecasted daily patronage is not significantly different between the alternatives, Alternative 7A is shorter, has fewer stations and costs less than half as much as Alternative 7B. For this reason it is recommended that Alternative 7A be retained for additional analysis in Screen 2 and Alternative 7B should not be carried forward into Screen 2.

### 5.5.3 Transportation Implications Beyond the I-66 Corridor

The ability of the Metrorail system to accommodate the additional passengers generated by the Metrorail extension in terms of downstream capacity needs to be determined.

# 6.0 RECOMMENDATIONS

Table 17 presents the recommended action for each of the alternatives considered in Screen 1. The recommendations are based on the conclusions presented in Section 5.0 of this report. The primary conclusions of the analysis are as follows:

- None of the alternative elements when analyzed in isolation will have a significant effect on traffic operations measured in terms of volume to capacity ratio.
- It is recommended that Alternative 3A, access improvements to the existing concurrent flow HOV lanes on I-66 not be carried forward to Screen 2. The forecast HOV-2+ travel demand exceeds the capacity of the existing concurrent flow HOV lane.
- It is recommended that HOV-3+ restrictions on I-66 HOV facilities be evaluated as part of Screen 2.
- It is recommended that Alternative 7B, Metrorail extension to Route 50/28 not be carried forward to Screen 2. While forecast station boardings are favorable, the length of the route and number of stations make the extension of Metrorail to Route 50/28 less desirable than the extension of Metrorail to Centreville.

Table 18 presents the format for developing the Screen 2 multi-modal transportation investment strategies. Each column in the table represents a multi-modal strategy to be evaluated in Screen 2. The Screen 2 alternatives will be defined by selecting combinations of single-mode elements from Screen 1B into logical multi-modal alternatives. The process will include the following steps:

- Completed travel demand analysis on Alternatives 3B, 5, and 11 with the Northern Virginia MIS Travel Demand Model.
- Reach conclusions/recommendations on each of these alternatives.
- Select candidate transportation modal element(s) to make up the 10 strategies to be analyzed in Screen 2.

## TABLE 17
## SCREEN 1B EVALUATION - RECOMMENDATIONS

| ELEMENT NUMBER | DESCRIPTION | RECOMMENDATION | DISCUSSION |
|---|---|---|---|
| 1* | Baseline Scenario | Evaluate in Screen 2 | The baseline and enhanced baseline are the base for comparison of other alternative elements. |
| 2* | Enhanced Baseline | Evaluate in Screen 2 | The baseline and enhanced baseline are the base for comparison of other alternative elements. |
| 3A | HOV Access Improvements | [redacted] | Forecast HOV-2+ travel demand (11,000 vehicles in the peak direction during the peak period) exceeds the capacity of the existing concurrent flow HOV lane. |
| 3B | HOV Extension | Evaluate in Screen 2 | Evaluate with Northern Virginia MIS Travel Model. |
| 3C* | Barrier Separated HOV | Evaluate in Screen 2<br>Evaluate HOV-3+ in Screen 2 | Barrier separated HOV lanes required to accommodate forecast HOV travel demand. |
| 4A | I-66 Improvements | Evaluate in Screen 2 | Forecast travel demand fully utilizes incremental capacity. |
| 4B | Upgrade Routes 29 and 50 | Evaluate in Screen 2 | Forecast travel demand fully utilizes incremental capacity. |
| 4C* | Improvements to I-66, Route 29 and Route 50 | Evaluate in Screen 2 | Forecast travel demand fully utilizes incremental capacity. |
| 5 | VRE Extension | Evaluate in Screen 2 | Evaluate with Northern Virginia MIS Travel Model. |
| 6A | LRT to Route 28/50 | Evaluate in Screen 2 | See 6C. |
| 6B | LRT to Manassas | Evaluate in Screen 2 | See 6C. |
| 6C* | LRT to Route 28/50 and Manassas | Evaluate in Screen 2 | Transit ridership forecasts (60,000 passengers per day on each line) greatly exceed Riders per Route-Mile of recently constructed LRT systems. |
| 7A* | Metrorail to Centreville | Evaluate in Screen 2 | Forecast station boardings on Metrorail extension to Centreville compares favorably to existing Metrorail system station boardings. Extension to Gainesville requires evaluation with Northern Virginia MIS Travel Model. |
| 7B* | Metrorail to Route 28/50 | [redacted] | Forecast station boardings are slightly less than Metrorail extension to Centreville with more stations (7 to Rt. 50/28, 4 to Centreville) and more miles of service (17 miles to Rt. 50/28, 11 miles to Centreville). |
| 11 | Reversible General Purpose Express Lanes | Evaluate in Screen 2 | Evaluate with Northern Virginia MIS Travel Model. |

* These elements were modeled as part of the Screen 1B Evaluation.

**TABLE 18**
**DEVELOPMENT OF SCREEN 2 MULTI-MODAL TRANSPORTATION INVESTMENT STRATEGIES FOR THE I-66 MIS**

| CANDIDATE TRANSPORTATION MODAL ELEMENTS | TRANSPORTATION INVESTMENT STRATEGY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3B - HOV EXTENSION ON ROUTE 29 | | | | | | | | | | |
| 3C - BARRIER SEPARATED | | | | | | | | | | |
| 4A - I-66 IMPROVEMENTS | | | | | | | | | | |
| 4B - UPGRADE ROUTES 29 AND 50 | | | | | | | | | | |
| 4C - IMPROVEMENTS TO I-66, ROUTE 29 AND ROUTE 50 | | | | | | | | | | |
| 5 - VRE EXTENSION | | | | | | | | | | |
| 6A - LRT TO ROUTE 28/50 | | | | | | | | | | |
| 6B - LRT TO MANASSAS | | | | | | | | | | |
| 6C - LRT TO ROUTE 28/50 AND MANASSAS | | | | | | | | | | |
| 7A - METRORAIL TO CENTREVILLE | | | | | | | | | | |
| 11 - REVERSIBLE GENERAL PURPOSE EXPRESS LANES | | | | | | | | | | |
| ADDITIONAL ELEMENTS | | | | | | | | | | |

# APPENDIX 1

Bus Transit System

**Baseline Alternative**

includes current Metro, Cue, Fairfax Connector, RIBS and PRTC routes and routes identified in the CLRP
with at least one route end within the study corridor

*changes from current indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| R,m | 60/60 | 1B | Ballston - Dunn Loring | BALLSTON Sta., Wilson, Willston, Patrick Henry, Leesburg Pike, Arlington, Fairview Park, Lakeford, Lee Hwy, Gallows to DUNN LORING Sta. | [ current ] |
| R,m | 60/60 | 1C | Ballston - Fair Oaks | BALLSTON Sta., Wilson, Willston, Patrick Henry, Leesburg Pike, Arlington, Lee Hwy, Lee Jackson to Fair Oaks Mall | [ current ] |
| R,p | 60/-- | 1D | Ballston - Dunn Loring | BALLSTON Sta., Wilson, Willston, Patrick Henry, Leesburg Pike, Arlington, Fairview Park, Lakeford, Lee Hwy, Gallows to DUNN LORING Sta. | [ current ] |
| R,p | 60/-- | 1F | Ballston - Fairfax Circle | Wilson, Willston, Patrick Henry, Leesburg Pike, Arlington, Lee Hwy to Fairfax Circle | [ current ] |
| R,p | 60/-- | 1ZCe | Fairfax Circle - Ballston | Fairfax Circle, Lee Hwy, Arlington, Leesburg Pike, Patrick Henry, Willston, Wilson to BALLSTON Sta. | [ current ], bypasses Seven Corners |
| R,p | 60/-- | 1Ze | Fair Oaks - Ballston | Fair Oaks Mall, Lee Jackson, Lee Hwy, Arlilngton, Wilson, BALLSTON Sta. | [ current ] |
| R,m | 30/30 | 2B | Fair Oaks - Ballston | Fair Oaks Mall, Lee Jackson, Jermantown, Blake, Lee Hwy, VIENNA Sta., Lee Hwy, Washington St, Washington Bl, Glebe, BALLSTON Sta. | [ current ] |
| R,m | 30/30 | 2C | Tysons Corner - Ballston via Dunn Loring | Tysons Galleria, International, Greensboro, Gosnell, Chain Bridge, Maple, Court House, Cottage, Cedar, Bowling Green, Cottage, Gallows, DUNN LORING Sta., Washington St, Washington Bl, Glebe, BALLSTON Sta. | [ current ] |
| R,p | 30/-- | 2G | Fair Oaks - Ballston | Fair Oaks Mall, Lee Jackson, Jermantown, Arrowhead, Rosehaven, Blake, Lee Hwy, VIENNA Sta., Lee Hwy, Washington St, Washington Bl, Glebe, BALLSTON Sta. | [ current ] |
| F,p | 30/-- | 2W | Vienna-Oakton-Vienna | VIENNA Sta., Blake, Bushman, Flagpole, White Granite, Chain Bridge, Nutley, VIENNA Sta. | [current] |
| F,p | 20/-- | 5A | Baron Cameron/Rte 7 - W. Falls Church | Baron Cameron, Lake Fairfax, Hunt Club, Ring, North Shore, Whiele, <via DAAR>, WEST FALLS CHURCH Sta. | [ current ] |
| F,p | 20/-- | 5B | Stuart/Walnut Branch - W. Falls Church | Stuart, Lake Newport, Feston Pky, Center Harbor, North Village, Bennington Woods, Stevenage, Reston Pky, baron Cameron, Village, North Shore, Wiehle, <via DAAR>, WEST FALLS CHURCH Sta. | [ current ] |
| F,p | 20/-- | 5C | Glade/Crows Nest - W. Falls Church | Glade, Freetown, Oslo, Reston Pky, Colts Nec,, Glade, Twin Branches, South Lakes, Sunrise Valley, Hunter Mill, <via DAAR>, WEST FALLS CHURCH Sta. | [ current ] |
| F,p | 15/-- | 5D | Twin Branches/Branford - W. Falls Church | Twin Branches, Lawyers, Reston Pky, Glade, Colts Neck, South Lakes, Soapstone, Sunrise Valley, Wiehle, <via DAAR>, WEST FALLS CHURCH Sta. | [ current ] |
| F,p | 20/-- | 5E | Lawyers/Viking - W. Falls Church | Viking, Fox Mill, Lawyers, Soapstone, South Lakes, Sunrise Valley, Wiehle, < via DAAR >, WEST FALLS CHURCH Sta. | [ current ] |
| F,p | 20/-- | 5F | Franklin Farm/Centreville - W. Falls Church | Kinross, Kilbrennan, Centreville, Franklin Farm, Lawyers, Reston Pky, Glade, Colts Neck, South Lakes, Soapstone, Sunrise Valley, Wiehle, <via DAAR>, WEST FALLS CHURCH Sta. | [ current ] |
| F,p | 2 trips | 5G | Viking Dr - W. Falls Church | Viking, Fox Mill, Lawyers, Soapstone, Glade, Colts Neck, Soapstone, Sunrise Valley, Hunter Mill, <via DAAR>, WEST FALLS CHURCH Sta. | [current], combination of 5C,E |
| F,p | 20/-- | 5H | W. Falls Church - Glade/Sunrise Valley | WEST FALLS CHURCH Sta., <via DAAR>, Hunter Mill, Sunrise Valley to Glade | [ current ] |
| F,p | 20/-- | 5J | W. Falls Church - Baron Cameron/Stuart | WEST FALLS CHURCH Sta., <via DAAR>, Sunset Hills, Reston Pky, Reston Town Center, Baron Cameron, Herndon Pky to Spring | [ current ] |
| C,p | 20/-- | 5N | Baron Cameron/Rte 7 - Crystal City | Baron Cameron, Lake Fairfax, Hunt Club, Ring, North Shore, Whiele, <via DAAR, I-66, Hwy 110>, Eads, Army Navy, PENTAGON CITY Sta., 15th, CRYSTAL CITY Sta. | [ current ] |
| C,p | 45/-- | 5P | Pinecrest/Fox Mill - Crystal City | Viking, Fox Mill, Lawyers, Soapstone, Glade, Reston, Colts Neck, South Lakes, Soapstone, Sunrise Valley, Reston PR, <via DAAR, I-66, Hwy 110>, Eads, Army Navy, PENTAGON CITY Sta., 15th, CRYSTAL CITY Sta. | [ current ] |
| R,m | 30/30 | 5S | Herndon - W. Falls Church via Leesburg Pike | Florida, Alabama, Elden, Baron Cameron, Town Center Pky, Library, Reston Pky, South Lakes, Pinecrest, Glade, Colts Neck, Sunrise Valley, Wiehle, North Shore, Ring, Hunt Club, Lake Fairfax, Baron Cameron, Leesburg Pike, Westpark, International, Ring, Tysons Corner, Leesburg Pike to WEST FALLS CHURCH Sta. | [ current ] |
| R,p | 1 trip | 5V | World Gate PR - W. Falls Church | Worldgate, Monroe, Herndon Pky, Spring, Sunset Hills, Wiehle, <via DAAR>, WEST FALLS CHURCH Sta. | [current], replaced by Monroe PR services |
| R,p | 30/-- | 5W | Dulles Corner - W. Falls Church | WEST FALLS CHURCH Sta., <via DAAR>, Wiehle, Sunset hills, Reston Pky,, Sunrise Valley, Monroe, Worldgate, Centreville, Fox Mill, Dulles Technology | [ current ] |
| R,p | 30/-- | 5X | Reston South - W. Falls Church | Lawyers/Reston Pky, Reston Pky, <via DAAR>, WEST FALLS CHURCH Sta. | [ current ] |
| F,p | 30/-- | 5Y | Herndon - W. Falls Church | Baron Cameron/Bracknell, Dranesville, Park, Grace, Alabama, Autumn, Summerfield, Herndon, Elden, Parcher, Springer, Parcher, Worldgate, Monroe, Sunrise Valley, Fairfax Pky, <via DAAR>, WEST FALLS CHURCH Sta. | [ current ] |
| R,p | 30/-- | 5Z | Herndon - W. Falls Church | Leesburg Pike/Riva Ridge, Leesburg Pike, Dranesville, Park, Grace, Alabama, Autumn, Summerfield, Herndon, Elden, Parcher, Springer, Parcher, Worldgate, Monroe, Sunrise Valley, Fairfax Pky, <via DAAR>, WEST FALLS CHURCH Sta. | [current] |

**Baseline Alternative**

includes current Metro, Cue, Fairfax Connector, RIBS and PRTC routes and routes identified in the CLRP
with at least one route end within the study corridor

*changes from current indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| F,m | 30/30 | 12CD | Centreville North - Vienna | Braddock, Newton Patent, Awbrey Patent, Stone, Wycombe, Billingsgate, Gothwaite, Paddington, Stone, Centreville PR, Stone, Lee Hwy, <via I-66>, VIENNA Sta. | [ current ] |
| F,p | 20/-- | 12EF | Centreville South - Vienna | Centreville PR, Lee Hwy, Machen, St. Germaine, Cool Oak, Golden Oak, St. Germain, Centreville Crest, Centreville Square PR, Centreville Crest, St. Germaine, Centrewood, Lee Hwy, Sully, <via I-66>, VIENNA Sta. | [ current ] |
| F,p | 20/-- | 12LM | Little Rocky Run - Vienna | Centreville, New Braddock, Union Mill, Braddock, Little Rocky Run, Braddock Old Centreville, Lee Hwy, Sully, <via I-66>, VIENNA Sta. | [ current ] |
| F,p | 20/-- | 12N | Centreville Methodist Church - Vienna | Old Centreville, Centrewood, Lee Hwy, <via I-66>, VIENNA Sta. | [ current ] |
| F,p | 20/-- | 12R | Westfields (Sully Station) - Vienna | Poplar Tree/Braddock Ridge, Poplar Tree, Stonecroft, Conference Center, Stonecroft, Westfields, Park Meadow, Westfields, Sully, <via I-66>, VIENNA Sta. | [ current ], outbound am, inbound pm |
| F,p | 20/-- | 12S | Carlbern/Oldgate (Sully Station) - Vienna | Sully Park/Sully Lake, Sully Park, Stone, Braddock, Sully Station, Sully Station PR, Westfields, Newbrook, Poplar Tree, Stringfellow, <via I-66>, VIENNA Sta. | revised current route, delete segment along Fair Lakes |
| C,p | 30/-- | 15K | George Mason U - Rosslyn | University, Armstrong, Chain Bridge, Old Courthouse, Gallows, International, Dolley Madison, Chain Bridge, Beverly, Dolley Madison, George Wahington Pky to ROSSLYN Sta. | [ current ] |
| C,p | 30/-- | 15L | George Mason U - Rosslyn | University, Armstrong, Chain Bridge, Old Courthouse, Gallows, International, Dolley Madison, Chain Bridge, Beverly, Dolley Madison, Chain Bridge, Glebe, Military, Lee Hwy to ROSSLYN Sta. | [ current ], inbound am |
| R,p | 30/-- | 17A | Pentagon - George Mason | GMU, University, Ox, Braddock, Twinbrook, Guinea, Burke, Lake Braddock, Burke Lake, Braddock, Little River, <via Capital Beltway and I-395>, Pentagon | [ current ] |
| R,p | 30/-- | 17B | Kings Park West - Pentagon | Kings Park West, Twinbrook, Commonwealth, Zion, Guinea, Burke Centre PR/VRE, Guinea, Braddock, Rolling, Parliament, Southampton, Braddock, Queensberry, Leesville, Backlick, Braddock, Little River to Landmark Mall | [ current ] |
| R,p | 30/-- | 17F | Kings Park West - Pentagon | Kings Park West, Twinbrook, Guinea, Braddock, <via Capital Beltway and I-395>, Pentagon | [ current ] |
| R,p | 20/-- | 17G | George Mason Univ - Pentagon | GMU, University, Ox, Braddock, Pickett, Twinbrook, Braddock, Rolling, Parliament, Southampton, Braddock, <via Capital Beltway and I-395>, Pentagon | [ current ] |
| R,p | 15/-- | 17H | Kings Park West - Pentagon | Kings Park West, Twinbrook, Guinea, Zion, Sideburn, Commonwealth, Gainesborough, Commonwealth, Pommeroy, Burke, Lake Braddock, Burke Lake, Braddock,<via Capital Beltway and I-395>, Pentagon | [ current ] |
| R,p | 15/-- | 17K | Kings Park West - Pentagon | Kings Park West, Twinbrook, Guinea, Zion, Sideburn, Commonwealth, Guinea, Braddock, <via Capital Beltway and I-395>, Pentagon | [ current ] |
| R,p | 15/-- | 17L | Burke - Pentagon | Burke Centre PR/VRE, Roberts, Colony View, Roberts, Guinea, Burke, Southampton, Clydesdale, Danbury Forest, Braddock,<via Capital Beltway and I-395>, Pentagon | [ current ] |
| R,p | 20/-- | 18P | Oakleather/Burke Center - Pentagon | Burke Centre Pky, Ox, Oakland Park, Burr Oak, Burke Centre Pky, Burke Lake, Shiplett, Old Keene Mill, <via I-395.>, Pentagon | [ current ] |
| R,p | 20/-- | 18R | Coffer Woods - Pentagon | Burke Centre, Coffer Woods, Wards Grove, Coffer Woods, Burke Centre Pky, Wilmington, Burke Lake, Lee Chapel, Capella, Shiplett, Old Keene Mill, <via I-395>, Pentagon | [ current ] |
| F,p | 20/-- | 20A | Government Center/Fair Oaks - Vienna | VIENNA Sta., <via I-66>, Penderbrook, West Ox, Monument, Government Center Pky, Post Forest, West Ox, Monument, Fair Ridge, Lee Jackson, <via I-66>, VIENNA Sta. | [ current ], loop route, one-way operation on Penderbrook |
| F,p | 20/-- | 20F | Franklin Farm - Vienna | Centreville/Metrotech, Centreville, Franklin Farm, Fairfax Pky, Stringfelow, Lee Jackson, Greenbriar Shopping Center, Lee Jackson, <via I-66>, VIENNA Sta. | [ current ], inbound am, outbound pm |
| F,p | 20/-- | 20G | Chantilly - Vienna | Centreville/Metrotech, Centreville, Lee Jackson, <via I-66>, VIENNA Sta. | [ current ], outbound am, inbound pm |
| F,p | 20/-- | 20W | Chantilly - Vienna | Lafayette Center, Lee Jackson, Willard, Avion Pky, Lee Jackson, <via I-66>, VIENNA Sta. | [ current ], outbound am, inbound pm |
| F,p | 4 trips | 20X | Chantilly - Vienna | Lafayette Center, Lee Jackson, Lees Corner, Galesbury, Tabscott, Lees Corner, Lee Jackson, Greenbriar Shopping Center, Lee Jackson, <via I-66>, VIENNA Sta. | [ current ], inbound am, outbound pm |
| F,p | 20/-- | 20Y | Sullyfield Circle - Vienna | Sullyfield Circle, Lee Jackson, <via I-66>, VIENNA Sta. | [current], outbound am, inbound pm |
| F,p | 20/-- | 20Z | Sullyfield Circle - Vienna | Sullyfield Circle, Lee Jackson, Lees Corner, Galesbury, Tabscott, Lees Corner, Lee Jackson, Greenbriar Shopping Center, Lee Jackson, <via I-66>, VIENNA Sta. | [current], inbound am, outbound pm |
| F,p | 20/-- | 26G | Roberts Pky - Dunn Loring | Burke Center PR/VRE, Roberts Pke, Guinea, Little River, <via Capital Beltway>, Gallows to DUNN LORING Sta. | [ current ], inbound am, outbound pm |
| F,p | 20/-- | 26H | Dunn Loring - Roberts Pky | DUNN LORING Sta., Prosperity, Arlington, <via Capital Beltway>, Little River, Guinea, Roberts Pky | [ current ], outbound am, inbound pm |
| R,p | 20/-- | 29C | Pentagon - NVCC | Pentagon, <via I-395>, Little River to NVCC | [ current ], outbound am, inbound pm |

**Baseline Alternative**

includes current Metro, Cue, Fairfax Connector, RIBS and PRTC routes and routes identified in the CLRP
with at least one route end within the study corridor

*changes from current indicated by bold type*
*for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| R,p | 4 trips | 29E | Pentagon - Little River Tpke/Lake (NVCC) | Pentagon, <via I-395>, Little River, Duncan, Tollhouse, Wakefield Chapel, Graeburn, Olley, Little River to NVCC | [ current ], inbound am, outbound pm |
| R,p | 30/-- | **29F** | **Pickett Road - Pentagon** | Fairfax Circle, Pickett, Little River, Duke, Fairfax, Pendleton to Royal | **from CLRP; additional service on current route** |
| R,m | 60/60 | 29K | George Mason U - Alexandria | University, Armstrong, Chain Bridge, Main, Little River, Duke, Fairfax, Pendleton to Royal | [ current ] |
| R,m | 60/60 | 29N | Fairfax Circle - Royal/Pendleton | Fairfax Circle, Pickett, Little River, Duke, Fairfax, Pendleton to Royal | [ current ] |
| R,p | 20/-- | 29X | Little River Tpke/Lake (NVCC) - Pentagon | NVCC, Little River, Olley Braeburn, Wakefield Chapel, Tollhouse, Duncan, Little River, <via Capital Beltway and I-395>, Pentagon | [ current ], inbound am, outbound pm |
| C,m | 30/60 | 306 | George Mason U - Pentagon via Braddock | University, Armstrong, Ox, Braddock, Guinea, Burke, Lake Braddock, Burke Lake, Braddock, <via Capital Beltway and I-395>, Pentagon | [ current ] |
| C,m | 30/60 | 401 | Springfield Mall - Tysons Corners via Dunn Loring | Springfield Mall, Franconia, Commerce, Amherst, Backlick, Little River, Hummer, Gallows, International, Tysons Galleria | [ current ] |
| F,p | 35/-- | 402 | Vienna - Dunn Loring via Park St | VIENNA Sta., Nutley, Tapawingo, Cottage, Moore, Park, Cedar, Bowling Green, Cottage, Gallows, DUNN LORING Sta. | [ current ] |
| F,p | 35/-- | 403 | Vienna -Dunn Loring via Electric Av | VIENNA Sta., Nutley, Flint Hill, Malcolm, Lawyers, Maple, Follin, Vega, Security, Electric, Gallows, DUNN LORING Sta. | [ current ] |
| C,m | --/75 | 404 | George Mason U - Rosslyn via Tysons Corner | University, Armstrong, Chain Bridge, Old Courthouse, Gallows, International, Dolley Madison, Chain Bridge, Beverly, Dolley Madison, George Wahington Pky to ROSSLYN Sta. | [ current ] |
| C,m | 30/60 | **410** | **Burke Center PR - Reston/Lake Newport** | Burke Centre PR, Roberts Pky, Burke Centre Pky, Fairfax Pky, Ox, University, Main, Lee, Forum, Government Center, Monument, West Ox, Lawyers, Reston Pkwy to Leesburg Pike | **new; from CLRP** |
| C,m | 20/20 | **411** | **Reston Baron Cameron - Westpark** | Baron Cameron, Reston Town Center, <via DAAR>, International, Westpark, Tysons Galleria | **new; from CLRP** |
| F,m | 20/60 | **412** | **Reston Baron Cameron - Fair Oaks - Vienna** | Reston Town Center, Reston Pky, Baron Cameron, Elden, Centreville, West Ox, Fairfax Pky, Stringfellow, Fair Lakes, Monument, Fair Oaks Mall, <via I-66> to VIENNA Sta. | **new; from CLRP; Herndon local** |
| F,p | 20/-- | **413** | **Vienna - Route 28/DAAR** | VIENNA Sta., <via I-66, Fairfax Pky, West Ox>, Centreville, Coppermine, Horse Pen to Dulles Corner | **new; from CLRP; express** |
| F,m | 20/20 | **414** | **Route 28/I-66 - Vienna** | Centreville, Lee, Nutley, VIENNA Sta. | **new; from CLRP** |
| R,p | 20/-- | **417** | **Burke Center PR - Franconia/Springfield** | Roberts, Burke Center Pky, Burke Lake Rd, Rolling, Franconia/Springfield Pky, FRANCONIA/SPRINGFIELD Sta. | **new; from CLRP** |
| F,p | 30/-- | **501** | **Lawyers Rd - W. Falls Church** | Dulles Technology, Fox Mill, Horse Pen, Frying Pan, Sully Road, McLearen, Lawyers, Twin Branches, South Lakes, Sunrise Valley, Hunter Mill, <via DAAR> to W. FALLS CHURCH Sta. | **new; from CLRP** |
| F,p | 20/-- | **502** | **Reston Town Center - Tysons Corner** | Reston Pky, Sunset Hills, Wiehle, Soapstone, Lawyers, Twin Branches, Sunrise Valley, <via DAAR>, International to Tysons Corner | **new; from CLRP** |
| F,p | 30/-- | **504** | **Reston East - W. Falls Church** | Reston East PR, <via DAAR> to W. FALLS CHURCH Sta. | **new; from CLRP; Reston North PR replaced by Reston East** |
| F,p | 30/-- | **505** | **Wiehle Av - W. Falls Church** | Crestview/Wiehle, Wiehle, <via DAAR>to W. FALLS CHURCH Sta. | **new; from CLRP** |
| F,p | 30/-- | **506** | **NW Herndon - W. Falls Church** | Crestview/Wiehle, Crestview, Herndon Pky, Centreville, <via DAAR>to W. FALLS CHURCH Sta. | **new; from CLRP** |
| F,p | 30/30 | **507** | **Herndon Pky E. - Reston** | Herndon/Dranesville, Herndon Pky, Elden, Spring, Van Buren, Herndon/Monroe PR, Monroe, Sunrise Valley, Fairfax Pky, Baron Cameron, Town Center, Reston Town Center | **new; from CLRP; Herndon circulator** |
| F,p | 30/30 | **508** | **Herndon Pky W. - Herdon/Monroe PR** | Monroe, Van Buren, Herndon Pky, Monroe, Center, Florida, Herndon Pky, Herndon/Monroe PR | **new; from CLRP; Herndon circulator** |
| F,p | 4/-- | **509** | **W. Falls Church - Tysons Corner** | W. FALLS CHURCH Sta., <via DAAR>, International, Jones Branch, Westpark, Park Run, Tysons Bl, Tysons Galleria, International, Greensboro to Rotonda Condominiums [return to W. Falls Church Sta.] | **replaces Tysons Shuttle** |
| F,m | 30/30 | **510** | **Dulles Airport - W. Falls Church** | Dulles Airport, Dulles Toll Road, W. FALLS CHURCH Sta. | **new; from CLRP** |
| F,m | 30/30 | **511** | **Dulles Airport - Tysons Corner via Reston** | Dulles Airport, <via DAAR>, Fairfax Pky, Baron Cameron, Town Center Pky, Reston Town Center, Reston Pky, <via DAAR>, International, Tysons Galleria | **new; from CLRP** |
| R,m | 30/30 | **512** | **Dulles - Herndon - W. Falls Church** | Dulles Airport, <via DAAR>, Herndon/Monroe PR, <via DAAR> to W. FALLS CHURCH Sta. | **new** |
| F,m | 59/59 | **571** | **Vienna - Fairfax - Vienna** | VIENNA Sta., Blake, Kingsbridge, Draper, Lee Hwy, Warwick, Beva, Orchard, Jermantown, Main, Chain Bridge, University, Main, Old Lee, Blake to VIENNA Sta. | [ current CUE Gold route]; bi-directional loop |

**Baseline Alternative**

includes current Metro, Cue, Fairfax Connector, RIBS and PRTC routes and routes identified in the CLRP with at least one route end within the study corridor

*changes from current indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| F,m | 51/51 | 572 | Vienna - Fairfax - Vienna | VIENNA Sta., Blake, Lee Hwy, Chain Bridge, University, Main, Pickett, Old Pickett, Blake to VIENNA Sta. | [current CUE Green route]; bi-directional loop |
| F,m | 40/40 | 581 | Lake Anne Loop | Reston Town Center, Providence, North Shore, Tall Oaks Village, North Shore, Wiehle, North Shore, Beaconridge to Cedar Ridge, North Shore, Village, North Shore to Town Center | [current RIBS Route 1] |
| F,m | 40/40 | 582 | South Lakes Loop | Reston Town Center, Reston Pky, South Lakes, Sunrise Valley, Reston Pky to Town Center | [current RIBS Route 2] |
| F,m | 40/40 | 583 | Hunters Woods Loop | Reston Town Center, Reston Pky, Sunrise Valley, Glade, Colts Neck, Reston Pky to Town Center | [current RIBS Route 3] |
| F,m | 40/40 | 584 | North Point Loop | Reston Town Center, Town Center Pky, Baron Cameron, Herndon Centre, Baron Cameron, Bennington Woods, Reston Pky, Centre Harbor, Wiehle, Baron Cameron to Town Center | [current RIBS Route 4] |
| R,p | 20/-- | 591 | Manassas - Washington/Pentagon | Manassas Park/Centreville, Centreville, Church, Grant, Sudley, Sudley Manor, Williamson, Portsmouth PR, Sudley, <via I-66>, State Department, then limited stops to Pentagon | [current PRTC Route M1], serves DC stops first then Pentagon |
| R,p | 1 trip | 592 | Manassas - Pentagon/Washington | Manassas Park/Centreville, Centreville, Church, Grant, Sudley, Sudley Manor, Williamson, Portsmouth PR, Sudley, <via I-66>, Pentagon, then limited stops to State Department | [current PRTC Routes M2,3,4,5], serves Pentagon first then DC stops |
| F,p | 30/-- | 593 | Manassas - Vienna | Manassas Park/Centreville, Centreville, Church, Grant, Sudley, Sudley Manor, Williamson, Portsmouth PR, Sudley, <via I-66>, VIENNA Sta. | [current PRTC Routes VS1,2,3, 4,5,6,7,8] |
| F,p | 30/-- | 594 | Stonehouse/Coppermine - Manassas Pk VRE | MANASSAS PARK VRE Sta., Manassas Pk Dr, Lomond, Fairmont, Portsmouth, Portsmouth PR, Sudley, Centreville, Manassas Pk Dr to VRE Sta. | [current], bi-directional loop; corresponds to Manassas Park OmniLink Routes A and B and Manassas Promenade service |
| F,p | 30/-- | 595 | Promenade - Grant/Byrd via VRE | Sage/Coverstone, Rosemary, Ashton, Sudley Manor, Sudley, Portsmouth, Portsmouth PR, Sudley, Stonewall, Liberia, Centreville, Prescott, Church, Grant to Byrd | [current], operated in conjunction with Manassas Park Routes A and B |
| F,p | 30/-- | 596 | Clover Hill/Godwin - Manassas VRE | MANASSAS VRE Sta., Battle, Prince William, Grant, Dumfries, Waterford, Clover Hill, Sorrel, Brackets Ford, Sorrel, Clover Hill, Hastings, Shannon, Greanleaf, Cedar Ridge, Shannon, Hastings, Battlefield, Bens Way, Flowerden, Cloverhill, Strawflower, Amaryllis, Berkshire, Cloverhill, Wellington, Grant to VRE Sta. | [current], same as OmniLink Manassas Feeder route |

R = radial
F = feeder
C = crosstown

m = midday service
p = peak only service

Source: January 1996 WMATA Bus Route Map

## Enhanced Baseline Alternative

includes all Baseline Alternative routes AND new routes or route changes:

*changes from Baseline indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| R,m | 60/60 | 1B | Ballston - Dunn Loring | [ same as Baseline Alternative ] | |
| R,m | 60/60 | 1C | Ballston - Fair Oaks | [ same as Baseline Alternative ] | |
| R,p | 60/-- | 1D | Ballston - Dunn Loring | [ same as Baseline Alternative ] | |
| R,p | 60/-- | 1F | Ballston - Fairfax Circle | [ same as Baseline Alternative ] | |
| R,p | 60/-- | 1ZCe | Fairfax Circle - Ballston | [ same as Baseline Alternative ] | |
| R,p | 60/-- | 1Ze | Fair Oaks - Ballston | [ same as Baseline Alternative ] | |
| R,m | 30/30 | 2B | Fair Oaks - Ballston | [ same as Baseline Alternative ] | |
| R,m | 30/30 | 2C | Tysons Corner - Ballston via Dunn Loring | [ same as Baseline Alternative ] | |
| R,p | 30/-- | 2G | Fair Oaks - Ballston | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 2W | Vienna-Oakton-Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 5A | Baron Cameron/Rte 7 - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 5B | Stuart/Walnut Branch - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 5C | Glade/Crows Nest - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 15/-- | 5D | Twin Branches/Branford - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 5E | Lawyers/Viking - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 5F | Franklin Farm/Centreville - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 2 trips | 5G | Viking Dr - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 5H | W. Falls Church - Glade/Sunrise Valley | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 5J | W. Falls Church - Baron Cameron/Stuart | [ same as Baseline Alternative ] | |
| C,p | 20/-- | 5N | Baron Cameron/Rte 7 - Crystal City | [ same as Baseline Alternative ] | |
| C,p | 45/-- | 5P | Pinecrest/Fox Mill - Crystal City | [ same as Baseline Alternative ] | |
| R,m | 30/30 | 5S | Herndon - W. Falls Church via Leesburg Pike | [ same as Baseline Alternative ] | |
| R,p | 1 trip | 5V | World Gate PR - W. Falls Church | [ same as Baseline Alternative ] | |
| R,p | 30/-- | 5W | Dulles Corner - W. Falls Church | [ same as Baseline Alternative ] | |
| R,p | 30/-- | 5X | Reston South - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 5Y | Herndon - W. Falls Church | [ same as Baseline Alternative ] | |
| R,p | 30/-- | 5Z | Herndon - W. Falls Church | [ same as Baseline Alternative ] | |
| F,m | 30/30 | 12CD | Centreville North - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 12EF | Centreville South - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 12LM | Little Rocky Run - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 12N | Centreville Methodist Church - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 12R | Westfields (Sully Station) - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 12S | Carlbern/Oldgate (Sully Station) - Vienna | [ same as Baseline Alternative ] | |
| C,p | 30/-- | 15K | George Mason U - Rosslyn | [ same as Baseline Alternative ] | |
| C,p | 30/-- | 15L | George Mason U - Rosslyn | [ same as Baseline Alternative ] | |
| R,p | 30/-- | 17A | Pentagon - George Mason | [ same as Baseline Alternative ] | |
| R,p | 30/-- | 17B | Kings Park West - Pentagon | [ same as Baseline Alternative ] | |
| R,p | 30/-- | 17F | Kings Park West - Pentagon | [ same as Baseline Alternative ] | |
| R,p | 20/-- | 17G | George Mason Univ - Pentagon | [ same as Baseline Alternative ] | |
| R,p | 15/-- | 17H | Kings Park West - Pentagon | [ same as Baseline Alternative ] | |
| R,p | 15/-- | 17K | Kings Park West - Pentagon | [ same as Baseline Alternative ] | |
| R,p | 15/-- | 17L | Burke - Pentagon | [ same as Baseline Alternative ] | |

**Enhanced Baseline Alternative**

includes all Baseline Alternative routes AND new routes or route changes:

*changes from Baseline indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| R,p | 20/-- | 18P | Oakleather/Burke Center - Pentagon | [ same as Baseline Alternative ] | |
| R,p | 20/-- | 18R | Coffer Woods - Pentagon | [ same as Baseline Alternative ] | |
| F,p | 20/-- | **20A** | **Government Center/Fair Oaks - Tysons Corner via Vienna** | [ Baseline route to Vienna ], VIENNA Sta, Virginia Center Blvd, Nutley, Chain Bridge, Gosnell, Greensboro, International to Tysons Galleria | **extend current route from Vienna** |
| F,p | 20/-- | 20F | Franklin Farm - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 20G | Chantilly - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 20W | Chantilly - Vienna | [ same as Baseline Alternative ] | |
| F,p | 4 trips | 20X | Chantilly - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 20Y | Sullyfield Circle - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 20Z | Sullyfield Circle - Vienna | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 26G | Roberts Pky - Dunn Loring | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 26H | Dunn Loring - Roberts Pky | [ same as Baseline Alternative ] | |
| R,p | 20/-- | 29C | Pentagon - NVCC | [ same as Baseline Alternative ] | |
| R,p | 4 trips | 29E | Pentagon - Little River Tpke/Lake (NVCC) | [ same as Baseline Alternative ] | |
| R,p | 30/-- | 29F | Pickett Road - Pentagon | [ same as Baseline Alternative ] | |
| R,m | 60/60 | 29K | George Mason U - Alexandria | [ same as Baseline Alternative ] | |
| R,m | 60/60 | 29N | Fairfax Circle - Royal/Pendleton | [ same as Baseline Alternative ] | |
| R,p | 20/-- | 29X | Little River Tpke/Lake (NVCC) - Pentagon | [ same as Baseline Alternative ] | |
| C,m | 30/60 | **109** | **Huntington - Springfield - Burke Center** | Shiplett, Capella, Burke Center, Roberts, Guinea, Zion, BURKE CENTER PR/VRE | **extend from current terminus at Rolling Valley Mall** |
| C,m | 30/60 | 306 | **Stringfellow PR - Pentagon via Braddock/GMU** | Stringfellow PR, Fair Lakes, Fair Oaks Mall, Monument, Government Center, Forum, Lee Hwy, Shirley Gate, Braddock, [ continue via current route ] | **extend west from Fair Oaks Mall** |
| C,m | 30/60 | 401 | Springfield Mall - Tysons Corners via Dunn Loring | [ same as Baseline Alternative ] | |
| F,p | 35/-- | 402 | Vienna - Dunn Loring via Park St | [ same as Baseline Alternative ] | |
| F,p | 35/-- | 403 | Vienna - Dunn Loring via Electric Av | [ same as Baseline Alternative ] | |
| C,m | --/75 | 404 | George Mason U - Rosslyn via Tysons Corner | [ same as Baseline Alternative ] | |
| C,m | 30/60 | 410 | Burke Center PR - Reston/Lake Newport | [ same as Baseline Alternative ] | |
| C,m | 20/20 | 411 | Reston Baron Cameron - Westpark | [ same as Baseline Alternative ] | |
| F,m | 20/60 | **412** | **Reston Baron Cameron - Vienna** | Reston Town Center, Reston Pky, Baron Cameron, Elden, Centreville, West Ox, Fairfax Pky, Stringfellow,<via I-66> to VIENNA Sta. | **operate via HOV lanes from Stringfellow PR; Fair Lakes segment served by Route 306** |
| F,p | 20/-- | 413 | Vienna - Route 28/DAAR | [ same as Baseline Alternative ] | |
| F,m | 20/20 | 414 | Route 28/I-66 - Vienna | [ same as Baseline Alternative ] | |
| R,p | 20/-- | 417 | Burke Center PR - Franconia/Springfield | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 501 | Lawyers Rd - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 502 | Reston Town Center - Tysons Corner | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 503 | Sugarland - Reston Town Center | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 504 | Reston East - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 505 | Wiehle Av - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 506 | NW Herndon - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 507 | Herndon/Monroe PR - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 508 | Herndon Pky - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 4/-- | 509 | W. Falls Church - Tysons Corner | [ same as Baseline Alternative ] | |

**Enhanced Baseline Alternative**

includes all Baseline Alternative routes AND new routes or route changes:

*changes from Baseline indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| F,p | 30/30 | 510 | Dulles Airport - W. Falls Church | [ same as Baseline Alternative ] | |
| F,p | 20/-- | 511 | Dulles Airport - Tysons Corner via Reston | [ same as Baseline Alternative ] | |
| F,m | 59/59 | 571 | Vienna - Fairfax - Vienna | [ same as Baseline Alternative ] | |
| F,m | 51/51 | 572 | Vienna - Fairfax - Vienna | [ same as Baseline Alternative ] | |
| F,m | 40/40 | 581 | Lake Anne Loop | [ same as Baseline Alternative ] | |
| F,m | 40/40 | 582 | South Lakes Loop | [ same as Baseline Alternative ] | |
| F,m | 40/40 | 583 | Hunters Woods Loop | [ same as Baseline Alternative ] | |
| F,m | 40/40 | 584 | North Point Loop | [ same as Baseline Alternative ] | |
| R,p | 20/-- | 591 | Manassas - Washington/Pentagon | [ same as Baseline Alternative ] | |
| R,p | 1 trip | 592 | Manassas - Pentagon/Washington | [ same as Baseline Alternative ] | |
| F,p | 30/-- | **593** | **Manassas - Tysons Corner via Vienna** | Manassas Park/Centreville, Centreville, Church, Grant, Sudley, Sudley Manor, Williamson, Sudley, NVCC PR, <via I-66>, VIENNA Sta., <via I-66 and Capital Beltway>, Leesburg Pike, International, Westpark | **extend PRTC Routes VS1,2,3, 4,5,6,7,8** |
| F,p | 30/-- | **594** | **Stonehouse/Coppermine - Manassas Park VRE - Prince William Pky** | MANASSAS PARK VRE Sta., Manassas Pk Dr, Lomond, Fairmont, Portsmouth, Sudley, Centreville, Manassas Pk Dr, MANASSAS PARK VRE, Manassas Dr, Signal View, Signal Hill, Moore to Prince William Pky | **extend to new residential area southeast of VRE station** |
| F,p | 30/-- | 595 | Promenade - Grant/Byrd via VRE | [ same as Baseline Alternative ] | |
| F,p | 30/-- | 596 | Clover Hill/Godwin - Manassas VRE | [ same as Baseline Alternative ] | |
| R,m | --/60 | **802** | [2] **Centreville - Fair Oaks** | Centreville PR, Stone, Paddington, Gothwaite, Billingsgate, Stone, Awbrey Patent, Newton Patent, Braddock, Sully, Centrevillle, New Braddock, Old Clifton, Clifton, Stringfellow, Stringfellow PR, Fair Lakes, Fair Oaks Mall | **new local route; midday only** |
| R,p | 30/-- | **811** | [1] **Reston Town Center - Merrifield** | Reston Pky, <via Dulles Toll Road and Capital Beltway>, Gallows Road to DUNN LORING Sta. | **new** |
| R,p | 30/-- | **813** | [1] **Centreville PR/Stringfellow PR - Tysons Galleria** | Centreville PR (Stone Rd), Lee Hwy, Stringfellow, Stringfellow PR, <via I-66 and Capital Beltway>, Leesburg Pike to Tysons Galleria | **new** |
| C,p | 30/-- | **814** | [1] **Centreville PR/Stringfellow PR - Franconia/Springfield** | Centreville PR (Stone Rd), Lee Hwy, Stringfellow, Stringfellow PR, <via I-66, Capital Beltway, I-395>, Franconia, Frontier, FRANCONIA/SPRINGFIELD Sta. | **new** |
| R,p | 30/-- | **817** | [1] **Centreville - Merrifield/Dunn Loring** | Centreville PR (Stone Rd), Lee Hwy, Stringfellow PR, <via I-66 and Capital Beltway>, Arlington, Gallows, DUNN LORING Sta. | **new** |
| C,m | --/60 | **820** | **Manassas - Herndon, Local** | MANASSAS VRE, Centreville, Walney, Centreville, Elden, Baron Cameron, Reston Pky, Reston Town Center | **new local route; midday only** |
| R,p | 30/-- | **822** | **Manassas - Government Center, Local** | MANASSAS VRE, Centreville, Lee Hwy, Stringfellow, Fair Lakes, Fair Oaks Mall, Monument, Government Center | **new** |
| R,p | 30/-- | **824** | **Haymarket/Gainesville - Gov't Center via I-66** | John Marshall Hwy, Lee Hwy, Gainesville PR, <via I-66>, Lee Hwy, Centreville PR, Centreville, <via I-66>, Monument to Government Center . | **new** |
| R,p | 30/-- | **826** | **Haymarket/Gainesville - Tysons Corner via Vienna** | John Marshall Hwy, Lee Hwy, Gainesville PR, <via I-66>, VIENNA Sta., <via I-66 and Capital Beltway>, Leesburg Pike, International, Westpark | **new** |
| C,m | 30/60 | **828** | [1] **Sully Rd - Broad Run VRE** | Dulles Technology Dr, Fox Mill, Horse Pen, Frying Pan, Centreville, Westfields, Sully, Lee Hwy, Centreville PR (Stone Rd), <via I-66 and Route 28 Bypass>, Godwin, Nokesville, BROAD RUN VRE | **[reference Route PW1]** |
| F,p | 30/-- | **829** | [1] **Maplewood/VA 28 - Nokesville** | Maplewood Dr/Centreville, Centreville, Church, Center, Nokesville, to Fitzwater Dr | **[reference Route PW3]** |
| C,p | 30/-- | **840** | [1] **Franconia/Springfield - Fair Oaks** | FRANCONIA/SPRINGFIELD Sta., Franconia/Springfield Pky, Fairfax Pky, Roberts, New Guinea, Ox, Burke Center, Faifax Pky, West Ox, Lee, Forum, Government Center, Monument, Fair Oaks Mall | **new** |
| R,m | 30/60 | **850** | **Dulles Corner - Government Center** | Horse Pen, Coppermine, Centreville, Lees Corner, Lee Jackson, Stringfellow, Fair Lakes, Monument to Government Center | **new** |
| R,p | 30/-- | **860** | **South Reiding PR - Fair Oaks/Gov't Center** | John Mosby Hwy/Loundoun Cty 606, John Mosby, Lee Jackson, West Ox, Monument, Government Center | **new** |
| F,p | 30/-- | **861** | **South Reiding PR - Vienna** | John Mosby Hwy/Loundoun Cty 606, John Mosby, Lee Jackson, <via I-66>, VIENNA Sta. | **new** |
| R,p | 30/-- | **862** | **Centerville - Pentagon** | Centerville PR (Stone Rd), <via I-66>, Pentagon | **new** |
| F,p | 30/-- | **866** | **Haymarket/Gainesville - Manassas VRE** | Washington Street/James Madison, John Marshall Hwy, Lee Hwy, Gainesville PR, Wellington, Nokesville, Center, Church, Main, MANASSAS VRE | **new** |

## Enhanced Baseline Alternative

includes all Baseline Alternative routes AND new routes or route changes:

*changes from Baseline indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| F,p | 30/-- | **867** | **Haymarket/Gainesville - Broad Run VRE** | Washington Street/James Madison, John Marshall Hwy, Lee Hwy, Gainesville PR, Linton Hall, Nokesville, Bristow, Broad Run VRE | **new** |

*[1] Routes and route changes identified in the PFT2 network*
*[3] Routes and route changes identified in the NVTC report*

R = radial
F = feeder
C = crosstown

m = midday service
p = peak only service

## Alternative 6C

includes all Enhanced Baseline Alternative routes; route modifications or new routes are noted in the following listing

*new or deleted routes indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| F,p | 20/-- | 5F | Franklin Farm/Centreville - W. Falls Church | [ Enhanced Baseline route ], Franklin Farm, Centreville, Lees Corner, CHANTILLY EAST Sta. | extend to Chantilly East Sta. |
| R,m | 30/30 | 5S | Herndon - W. Falls Church via Leesburg Pike | [ Enhanced Baseline route ], Elden, Centreville, Coppermine, Horse Pen | extend to Dulles Corner |
| F,m | 30/30 | **12CD** | **Centreville North - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 911 and 802** |
| F,p | 20/-- | **12EF** | **Centreville South - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 910 and 802** |
| F,p | 20/-- | **12LM** | **Little Rocky Run - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 910** |
| F,p | 20/-- | **12N** | **Centreville Methodist Church - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by restructured Route 802** |
| F,p | 20/-- | **12R** | **Westfields (Sully Station) - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 911** |
| F,p | 20/-- | **12S** | **Carlbern/Oldgate (Sully Station) - Vienna** | [ Enhanced Baseline route from Sully Station ], Stringfellow PR, <via I-66>, VIENNA Sta. | **delete; replaced by Route 912** |
| F,p | 20/-- | **20A** | **Government Center/Fair Oaks - Tysons Corner via Vienna** | [ same as Enhanced Baseline ] | **delete, replace by Route 920 in Fair Oaks area** |
| F,p | 20/-- | 20F | Chantilly - Franklin Farm - Greenbriar | CHANTILLY Sta., Centreville, Franklin Farm, Fairfax Pky, Stringfellow, Lee Jackson, GREENBRIAR Sta. | shorten route; make feeder to rail stations |
| F,p | 20/-- | 20G | Chantilly - Franklin Farm - Greenbriar | CHANTILLY Sta., Centreville, Franklin Farm, Fairfax Pky, Stringfellow, Lee Jackson, GREENBRIAR Sta. | shorten route; make feeder to rail stations |
| F,p | 20/-- | 20W | Chantilly - Lafayette Center | [ same as Enhanced Baseline ] | operate to Chantilly Sta. only; delete service to Vienna |
| F,p | 4 trips | 20X | Chantilly - Lafayette Center | [ same as Enhanced Baseline ] | operate to Chantilly Sta. only; delete service to Vienna |
| F,p | 20/-- | **20Y** | **Sullyfield Circle - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 911** |
| F,p | 20/-- | **20Z** | **Sullyfield Circle - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 911** |
| C,m | 30/60 | 306 | Fair Oaks - Pentagon via Braddock/GMU | FAIR OAKS Sta., [ Enhanced Baseline route ] | shorten route to operate from Fair Oaks Sta.; delete segment from Stringfellow PR |
| C,m | 30/60 | 410 | Burke Center PR - Reston/Lake Newport | Burke Centre PR, Roberts Pky, Burke Centre Pky, Fairfax Pky, Ox, University, Main, Lee Hwy, Forum, Government Center, Monument, FAIR OAKS Sta., West Ox, Lawyers, Reston Pkwy to Leesburg Pike | serve Fair Oaks Sta. |
| F,m | 20/60 | 412 | Reston Baron Cameron - Stringfellow - Clifton | Reston Town Center, Reston Pky, Baron Cameron, Elden, Centreville, West Ox, Fairfax Pky, Stringfellow, Lee Hwy, CLIFTON Sta. | terminate route at Clifton Sta.; delete segment from Stringfellow PR to Vienna |
| F,p | 20/-- | 413 | Fair Oaks - Route 28/DAAR | FAIR OAKS Sta., Fair Lakes, Fairfax Pky, West Ox, Centreville, Coppermine, Horse Pen to Dulles Corner | begin service at Fair Oaks Sta.; delete service to Vienna |
| F,p | 30/-- | 501 | Lawyers Rd - W. Falls Church | Dulles Technology, Fox Mill, Horse Pen, Frying Pan, Sully Road, MCLEAREN Sta., McLearen, Lawyers, Twin Branches, South Lakes, Sunrise Valley, Hunter Mill, <via DAAR>, W. FALLS CHURCH Sta. | serve McLearen Sta. |
| F,p | 30/-- | **593** | **Manassas - Fair Oaks** | Manassas Park/Centreville, Centreville, Church, Grant, Sudley, Sudley Manor, Williamson, Sudley, NVCC PR, <via I-66>, FAIR OAKS Sta. | **delete** |
| F,p | 30/-- | 596 | Clover Hill/Godwin - Manassas VRE - Manassas Park | [ Enhanced Baseline route to Manassas VRE Sta. ], Main, Prescott, Centreville, MANASSAS PARK/CENTREVILLE Sta. | extend route from Manassas downtown to Manassas Park Dr/Centreville Sta. |
| R,m | 20/60 | 802 | Centreville - Fair Oaks | CENTREVILLE Sta., Stone, Paddington, Gothwaite, Billingsgate, Stone, Awbrey Patent, Newton Patent, Braddock, Sully, Centrevillle, Lee Hwy, Centrewood, New Braddock, Old Clifton, Clifton, Lee Hwy, CLIFTON Sta. | add peak service; reroute over former Route 12N; terminate at Clifton Sta. |
| R,p | 30/-- | **813** | **Fair Oaks - Tysons Galleria** | FAIR OAKS Sta., <via I-66 and Capital Beltway>, Leesburg Pike to Tysons Galleria | begin service at Fair Oaks Sta; delete service from Centreville |

**Alternative 6C**

includes all Enhanced Baseline Alternative routes; route modifications or new routes are noted in the following listing

*new or deleted routes indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| C,p | 30/-- | 814 | Fair Oaks - Franconia/Springfield | FAIR OAKS Sta., <via I-66, Capital Beltway, I-395>, Franconia, Frontier, FRANCONIA/SPRINGFIELD Sta. | begin service at Fair Oaks Sta; delete service from Centreville |
| R,p | 30/-- | 817 | Fair Oaks - Merrifield/Dunn Loring | FAIR OAKS Sta., <via I-66 and Capital Beltway>, Arlington, Gallows, DUNN LORING Sta. | begin service at Fair Oaks Sta; delete service from Centreville |
| C,m | --/60 | 820 | Manassas - Herndon, Local | MANASSAS VRE, Centreville, Walney, Centreville, CHANTILLY WEST Sta., Centreville, Elden, Baron Cameron, Reston Pky, Reston Town Center | serve Chantilly West Sta. |
| R,p | 30/-- | **822** | **Manassas - Government Center, Local** | MANASSAS VRE, Centreville, Lee Hwy, Stringfellow, Fair Lakes, Fair Oaks Mall, Monument to Government Center | **delete** |
| R,p | 30/-- | 824 | Haymarket/Gainesville - Fair Oaks - Gov't Center via I-66 | John Marshall Hwy, Lee Hwy, Gainesville PR, <via I-66>, Lee Hwy, Centreville PR, Centreville, <via I-66>, Monument, FAIR OAKS Sta. to Government Center | serve Fair Oaks Sta. |
| R,p | 30/-- | **826** | **Haymarket/Gainesville - Tysons Corner via Vienna** | John Marshall Hwy, Lee Hwy, Gainesville PR, <via I-66>, VIENNA Sta., <via I-66 and Capital Beltway>, Leesburg Pike, International, Westpark | **delete; service to Tysons by Route 813** |
| C,m | 30/60 | 828 | Chantilly - Broad Run VRE | CHANTILLY WEST Sta., Centreville, Westfields, Sully, Lee Hwy, Centreville PR, Stone, <via I-66 and Route 28 Bypass>, Godwin, Nokesville, BROAD RUN VRE | begin route at Chantilly West Sta. |
| F,p | 30/-- | 829 | Maplewood/VA 28 - Nokesville | Maplewood Dr/Centreville, Centreville, MANASSAS PARK Sta., Centreville, Church, Center, Nokesville to Fitzwater Dr | serve Manassas Park Sta. |
| C,p | 30/-- | 840 | Franconia/Springfield - Fair Oaks | FRANCONIA/SPRINGFIELD Sta., Franconia/Springfield Pky, Fairfax Pky, Roberts, New Guinea, Ox, Burke Center, Faifax Pky, West Ox, Lee Hwy, GOVERNMENT CENTER Sta., Forum, Government Center, Monument, Fair Oaks Mall, FAIR OAKS Sta. | serve Government Center Sta. and Fair Oaks Sta. |
| R,m | 30/60 | 850 | Dulles Corner - Government Center | Horse Pen, Coppermine, Centreville, Lees Corner, Lee Jackson, Stringfellow, Fair Lakes, Monument, FAIR OAKS Sta., Government Center, Forum, GOVERNMENT CENTER Sta. | serve Government Center Sta. and Fair Oaks Sta. |
| R,p | 20/-- | 860 | South Reiding PR - Chantilly | John Mosby Hwy/Loundoun Cty 606, John Mosby, Lee Jackson, CHANTILLY WEST Sta. | terminate at Chantilly West Sta; continuing service via rail; increase peak headway |
| F,p | 30/-- | **861** | **South Reiding PR - Vienna** | John Mosby Hwy/Loundoun Cty 606, John Mosby, Lee Jackson, <via I-66>, VIENNA Sta. | **delete; service to Chantilly via Route 860** |
| R,p | 30/-- | **862** | **Centerville - Pentagon** | Centerville PR (Stone Rd), <via I-66>, Pentagon | **delete** |
| F,p | 30/-- | 866 | Haymarket/Gainesville - Manassas VRE - Manassas Park | [ Enhanced Baseline route to MANASSAS VRE ], Main, Center, Presott, Centreville, MANASSAS PARK Sta. | extend from Manassas downtown to Manassas Park Sta. |
| F,p | 20/-- | **901** | **Fairfax Circle - Kings Park - Chain Bridge** | FAIRFAX CIRCLE Sta., Old Pickett, Pickett, Little River, Olley, Braeburn, Guinea, Commonwealth, Gainsborough loop, Commonwealth, Sideburn, Ox, Chain Bridge, Lee, CHAIN BRIDGE Sta., University, Kenmore, <return> | **new** |
| F,p | 20/-- | **902** | **Fairfax Circle - Burke Center - Chain Bridge** | FAIRFAX CIRCLE Sta., Old Pickett, Pickett, Main, Burke Station, Braddock, Twinbrook, Guinea, Roberts, Burke Center, Oak Leather, Burr Oak, Oakland Park, Ox, Chain Bridge, Lee, CHAIN BRIDGE Sta., University, Kenmore, <return> | **new** |
| F,p | 20/-- | **910** | **Little Rocky Run - Centreville** | CENTREVILLE Sta., Lee Hwy, Old Centreville, Braddock, Little Rocky Run, Braddock, Clifton, Stringfellow to STRINGFELLOW Sta. | **new; replaces Route 12LM** |
| F,p | 20/-- | **911** | **Westfields (Sully Station) - Centreville** | Conference Center, Stonecroft, Westfields, Poplar Tree, Stone, CENTREVILLE Sta. | **new; replaces Route 12R** |
| F,p | 20/-- | **912** | **Centreville - Sully Station - Stringfellow** | [ Enhanced Baseline route from Sully Station ], Stringfellow PR, STRINGFELLOW Sta. | **new; replaces Route 12S** |
| F,m | 20/30 | **920** | **Fair Oaks - Government Center Loop** | FAIR OAKS Sta., Fair Lakes, Monument, West Ox, Penderbrook, FAIR OAKS Sta. | **new; clockwise loop; replaces Route 20A** |

R = radial
F = feeder
C = crosstown

m = midday and peak service
p = peak only service

## Alternative 7A

includes all Enhanced Baseline Alternative routes; route modifications or new routes are noted in the following listing

*new or deleted routes indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| R,m | 60/60 | 1C | Ballston - Fair Oaks | [ Enhanced Baseline route to Fair Oaks Mall ], FAIR OAKS Sta. | extend to Fair Oaks Sta. |
| R,p | 60/-- | 1Ze | Fair Oaks - Ballston | [ Enhanced Baseline route to Fair Oaks Mall ], FAIR OAKS Sta. | extend to Fair Oaks Sta. |
| R,m | 30/30 | 2B | Fair Oaks - Ballston | [ Enhanced Baseline route to Fair Oaks Mall ], FAIR OAKS Sta. | extend to Fair Oaks Sta. |
| R,p | 30/-- | 2G | Fair Oaks - Ballston | [ Enhanced Baseline route to Fair Oaks Mall ], FAIR OAKS Sta. | extend to Fair Oaks Sta. |
| F,m | 30/30 | **12CD** | **Centreville North - Centreville** | [ same as Enhanced Baseline ] | **delete; replaced by Route 802** |
| F,p | 20/-- | 12EF | Centreville South - Centreville | CENTREVILLE Sta., Lee Hwy, Machen, [ Enhanced Baseline route ] | terminate at Centreville Sta., delete service to Vienna |
| F,p | 20/-- | **12LM** | **Little Rocky Run - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by 910** |
| F,p | 20/-- | 12N | Centreville Methodist Church - Centreville | CENTREVILLE Sta., Lee Hwy, Centrewood to New Braddock and PR | terminate at Centreville Sta., delete service to Vienna |
| F,p | 20/-- | **12R** | **Westfields (Sully Station) - Vienna** | [ same as Enhanced Baseline ] | **delete;replaced by 912** |
| F,p | 20/-- | **12S** | **Carlbern/Oldgate (Sully Station) - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by 911** |
| F,p | 20/-- | **20A** | **Government Center/Fair Oaks - Tysons Corner via Vienna** | [ same as Enhanced Baseline ] | **delete, replaced by Route 920 in Fair Oaks area and Route 990 from Dunn Loring for service to Tysons Corners** |
| F,p | 20/-- | 20F | Franklin Farm - Fair Oaks | Centreville/Metrotech, Centreville, Franklin Farm, Fairfax Pky, Stringfelow, Lee Jackson, Greenbriar Shopping Center, Lee Jackson, FAIR OAKS Sta. | terminate at Fair Oaks Sta.; delete service to Vienna |
| F,p | 20/-- | 20G | Chantilly - Fair Oaks | Centreville/Metrotech, Centreville, Lee Jackson, FAIR OAKS Sta. | terminate at Fair Oaks Sta.; delete service to Vienna |
| F,p | 20/-- | 20W | Chantilly - Fair Oaks | Lafayette Center, Lee Jackson, Willard, Avion Pky, Lee Jackson, FAIR OAKS Sta. | terminate at Fair Oaks Sta.; delete service to Vienna |
| F,p | 4 trips | 20X | Chantilly - Fair Oaks | Lafayette Center, Lee Jackson, Lees Corner, Galesbury, Tabscott, Lees Corner, Lee Jackson, Greenbriar Shopping Center, Lee Jackson, FAIR OAKS Sta. | terminate at Fair Oaks Sta.; delete service to Vienna |
| F,p | 20/-- | 20Y | Sullyfield Circle - Fair Oaks | Sullyfield Circle, Lee Jackson, FAIR OAKS Sta. | terminate at Fair Oaks Sta.; delete service to Vienna |
| F,p | 20/-- | 20Z | Sullyfield Circle - Fair Oaks | Sullyfield Circle, Lee Jackson, Lees Corner, Galesbury, Tabscott, Lees Corner, Lee Jackson, Greenbriar Shopping Center, Lee Jackson, FAIR OAKS Sta. | terminate at Fair Oaks Sta.; delete service to Vienna |
| C,m | 30/60 | 306 | Stringfellow PR - Pentagon via Braddock/GMU | STRINGFELLOW Sta. Fair Lakes, Fair Oaks Mall, Monument, Government Center, Forum, Lee Hwy, Shirley Gate, Braddock, [ continue via Enhanced Baseline route ] | terminate at Stringfellow Sta. |
| C,m | 30/60 | 410 | Burke Center PR - Reston/Lake Newport | [ Enhanced Baseline route ], Government Center , FAIR OAKS Sta., [ continue via Enhanced Baseline route ] | serve Fair Oaks Sta. |
| F,m | 20/60 | 412 | Reston Baron Cameron - Stringfellow | [ Enhanced Baseline route ], Stringfellow, STRINGFELLOW Sta. | terminate at Stringfellow Sta. |
| F,p | 20/-- | 413 | Fair Oaks - Route 28/DAAR | FAIR OAKS Sta., Fair Oakes Mall, [ Enhanced Baseline route ] | terminate at Fair Oaks Sta. |
| F,m | 20/20 | 414 | Centreville - Vienna | CENTREVILLE Sta., Lee Hwy, Nutley, VIENNA Sta. | begin at Centreville Sta. |
| F,p | 30/-- | **593** | **Manassas - Tysons Corner via Vienna** | [ same as Enhanced Baseline ] | **delete** |
| F,p | 30/-- | 594 | Stonehouse/Coppermine - Manassas Pk VRE - Prince William Pky | [ same as Enhanced Baseline ] | delete; replaced by Routes 994 and 996 |
| F,p | 30/-- | 595 | Manassas North - Promenade - Grant/Byrd via VRE | MANASSAS NORTH Sta., Sudley, Coverstone, Sage, Rosemary, Ashton, Sudley Manor, Sudley, Stonewall, Liberia, Centreville, Prescott, Church, Grant to Byrd | extend to MANASSAS NORTH Sta. |
| R,m | 20/60 | 802 | Centreville - Fair Oaks | CENTREVILLE Sta., Stone Rd, Paddington, Gothwaite, Billingsgate, Stone, Awbrey Patent, Newton Patent, Braddock, Sully, Centreville, New Braddock, Old Clifton, Clifton, Lee Hwy, Stringfellow, STRINGFELLOW Sta., Fair Lakes, FAIR OAKS Sta. | operate via rail station; provide all day service |
| R,p | 30/-- | **813** | **Centreville PR/Stringfellow PR - Tysons Galleria** | [ same as Enhanced Baseline ] | **delete** |
| C,p | 30/-- | **814** | **Centreville PR/Stringfellow PR - Franconia/Springfield** | [ same as Enhanced Baseline ] | **delete, service to Franconia/Springfield by Route 990** |

**Alternative 7A**

includes all Enhanced Baseline Alternative routes; route modifications or new routes are noted in the following listing

*new or deleted routes indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| R,p | 30/-- | **817** | **Centreville - Merrifield/Dunn Loring** | [ same as Enhanced Baseline ] | **delete** |
| C,m | 30/60 | 820 | Manassas - Herndon, Local | MANASSAS VRE, Centreville, New Braddock, CENTREVILLE Sta., Lee Hwy, Sully, Walney, Centreville, Elden, Baron Cameron, Reston Pky, Reston Town Center | operate via rail station; provide additional service |
| R,p | 30/-- | **822** | **Manassas - Government Center, Local** | MANASSAS VRE, Centreville, New Braddock, Stone, CENTREVILLE Sta. | **delete; additional service on Route 820** |
| R,p | 30/-- | **824** | **Haymarket/Gainesville - Gov't Center via I-66** | [ same as Enhanced Baseline ] | **delete; service to Gov't Center by rail; service to Gainesville station by Routes 866 and 867** |
| R,p | 30/-- | **826** | **Haymarket/Gainesville - Tysons Corner via Vienna** | [ same as Enhanced Baseline ] | **delete; service to Gainesville station by Routes 866 and 867; service to Tysons via Route 990 from Dunn Loring** |
| C,m | 30/60 | 828 | Sully Rd - Broad Run VRE via Centreville | [ Enhanced Baseline route ], Lee Hwy, Stone, CENTREVILLE Sta., [ continue via Enhanced Baseline route ] | operate via rail stations |
| C,p | 30/-- | 840 | Franconia/Springfield - Fair Oaks | [ Enhanced Baseline route ], FAIR OAKS Sta. | terminate at Fair Oaks Sta. |
| R,m | 30/60 | 850 | Dulles Corner - Government Center | [ Enhanced Baseline route ], Stringfellow, STRINGFELLOW Sta. | terminate at Stringfellow Sta. |
| R,p | 30/-- | 860 | South Reiding PR - Fair Oaks/Gov't Center | [ Enhanced Baseline route ], FAIR OAKS Sta., Government Center | increase frequeny; terminate at Fair Oaks Sta. |
| F,p | 30/-- | **861** | **South Reiding PR - Vienna** | [ same as Enhanced Baseline ] | **delete; service via Route 860** |
| R,p | 30/-- | **862** | **Centerville - Pentagon** | Centerville PR (Stone Rd), <via I-66>, Pentagon | delete; service via rail |
| F,p | 30/-- | 866 | Haymarket/Gainesville - Manassas VRE | Washington Street/James Madison, John Marshall Hwy, Lee Hwy, GAINESVILLE Sta., [ Enhanced Baseline route ], MANASSAS VRE | operate via rail station |
| F,p | 30/-- | 867 | Haymarket/Gainesville - Broad Run VRE | Washington Street/James Madison, John Marshall Hwy, Lee Hwy, GAINESVILLE Sta., [ Enhanced Baseline route ], Broad Run VRE | operate via rail station |
| F,p | 20/-- | **901** | **Vienna - Kings Park - Vienna** | ~~VIENNA Sta., Nutley, Arlington, Pickett, Little River, Olley, Braeburn, Guinea, Commonwealth, Gainsborough~~ loop, Commonwealth, Sideburn, Ox, Chain Bridge, Lee Hwy, Draper, Kingsbridge, Blake, Country Creek, VIENNA Sta. | **new** |
| F,p | 20/-- | **902** | **Vienna - Burke Center - Vienna** | VIENNA Sta., Nutley, Arlington, Pickett, Main, Burke Station, Braddock, Twinbrook, Guinea, Roberts, Burke Center, Oak Leather, Burr Oak, Oakland Park, Ox, Main, Old Lee Hwy, Blake, Country Creek, VIENNA Sta. | **new** |
| F,p | 20/-- | **910** | **Little Rocky Run - Centreville** | CENTREVILLE Sta., Lee Hwy, Old Centreville, Braddock, Little Rocky Run, Braddock, Clifton, Stringfellow to STRINGFELLOW Sta. | **new; replaces Route 12LM** |
| F,p | 20/-- | **911** | **Westfields (Sully Station) - Centreville** | Conference Center, Stonecroft, Westfields, Poplar Tree, Stone, CENTREVILLE Sta. | **new; replaces Route 12R** |
| F,p | 20/-- | **912** | **Centreville - Sully Station - Stringfellow** | [ Enhanced Baseline route from Sully Station ], Stringfellow PR, STRINGFELLOW Sta. | **new; replaces Route 12S** |
| F,m | 20/30 | **920** | **Fair Oaks - Government Center Loop** | FAIR OAKS Sta., Fair Lakes, Monument, West Ox, Penderbrook, FAIR OAKS Sta. | **new; clockwise loop; replaces Route 20A** |
| C,m | 20/30 | **990** | **Tysons Corners - Franconia Springfield via Gallows** | Westpark, International, Gallows, DUNN LORING Sta., <via Capital Beltway and I-395>, Franconia Road, Frontier, FRANCONIA/SPRINGFIELD Sta. | **new** |
| F,p | 60/-- | **994** | **Manassas North - Williamson - Prince William Pky** | MANASSAS NORTH Sta., Sudley, Williamson, Lomond, Manassas Dr, MANASSAS PARK VRE, Manassas Dr, Signal View, Signal Hill, Moore to Prince William Pky | **new** |
| F,p | 60/-- | **996** | **Manassas North - Sudley - Prince William Pky** | MANASSAS NORTH Sta., Sudley, Centreville, Manassas Dr, MANASSAS PARK VRE, Manassas Dr, Signal View, Signal Hill, Moore to Prince William Pky | **new** |

R = radial
F = feeder
C = crosstown

m = midday and peak service
p = peak only service

## Alternative 7B

includes all Enhanced Baseline Alternative routes; route modifications or new routes are noted in the following listing

*new or deleted routes indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| R,m | 30/30 | 5S | McLearen - Herndon - W. Falls Church via Leesburg Pike | MCLEAREN Sta., McLearen, Centreville, Elden, [ Enhanced Baseline route ] | serve McLearen Sta. |
| F,p | 20/-- | 12EF | Centreville South - Fair Oaks | [ Enhanced Baseline route ], <via I-66>, FAIR OAKS Sta. | terminate route at Fair Oaks; delete service to Vienna |
| F,p | 20/-- | **12LM** | **Little Rocky Run - Fair Oaks** | [ Enhanced Baseline route ], <via I-66>, FAIR OAKS Sta. | **terminate route at Fair Oaks; delete service to Vienna** |
| F,p | 20/-- | **12N** | **Centreville Methodist Church - Fair Oaks** | [ Enhanced Baseline route ], <via I-66>, FAIR OAKS Sta. | **terminate route at Fair Oaks; deleter service to Vienna** |
| F,p | 20/-- | **12R** | **Westfields (Sully Station) - Vienna** | [ same as Enhanced Baseline ] | **delete;replaced by 912** |
| F,p | 20/-- | **12S** | **Carlbern/Oldgate (Sully Station) - Vienna** | [ Enhanced Baseline route from Sully Station] , Stringfellow PR, <via I-66> to VIENNA Sta. | **delete; replaced by 911** |
| F,p | 20/-- | **20A** | **Government Center/Fair Oaks - Tysons Corner via Vienna** | [ same as Enhanced Baseline ] | **delete, replace by Route 920 in Fair Oaks area** |
| F,p | 20/-- | 20F | Chantilly - Franklin Farm - Greenbriar | CHANTILLY Sta., Centreville, Franklin Farm, Fairfax Pky, Stringfellow, Lee Jackson to GREENBRIAR Sta. | truncate route to serve as residential feeder |
| F,p | 20/-- | 20G | Chantilly - Franklin Farm - Greenbriar | CHANTILLY Sta., Centreville, Franklin Farm, Fairfax Pky, Stringfellow, Lee Jackson to GREENBRIAR Sta. | truncate route to serve as residential feeder |
| F,p | 20/-- | 20W | Chantilly - Lafayette Center | [ same as Enhanced Baseline ] | operate to Chantilly Sta. only; delete service to Vienna |
| F,p | 20/-- | 20X | Chantilly - Lafayette Center | [ same as Enhanced Baseline ] | operate to Chantilly Sta. only; delete service to Vienna |
| F,p | 20/-- | **20Y** | **Sullyfield Circle - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 911** |
| F,p | 20/-- | **20Z** | **Sullyfield Circle - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 911** |
| C,m | 30/60 | 410 | Burke Center PR - Reston/Lake Newport | Burke Centre PR, Roberts Pky, Burke Centre Pky, Fairfax Pky, Ox, University, Main, Lee Hwy, Forum, Government Center, Monument, FAIR OAKS Sta., West Ox, Lawyers, Reston Pky to Leesburg Pike | serve Fair Oaks Sta. |
| F,m | 20/60 | 412 | Reston Baron Cameron - Fair Oaks | Reston Town Center, Reston Pky, Baron Cameron, Elden, Centreville, West Ox, Fairfax Pky, Stringfellow, <via I-66> to FAIR OAKS Sta. | operate to Fair Oaks via I-66; delete segment along Fair Lakes |
| F,p | 20/-- | 413 | Vienna - Route 28/DAAR | FAIR OAKS Sta., <via I-66>, Fairfax Pky, West Ox, Centreville, Coppermine, Horse Pen to Dulles Corner | begin service at Fair Oaks Sta. |
| F,p | 30/-- | 501 | Lawyers Rd - W. Falls Church | Dulles Technology, Fox Mill, Horse Pen, Frying Pan, Sully Road, MCLEAREN Sta., McLearen, Lawyers, Twin Branches, South Lakes, Sunrise Valley, Hunter Mill, <via DAAR>, W. FALLS CHURCH Sta. | serve McLearen Sta. |
| F,p | 30/-- | 593 | Manassas - Fair Oaks | Manassas Park/Centreville, Centreville, Church, Grant, Sudley, Sudley Manor, Williamson, Sudley, NVCC PR, <via I-66>, FAIR OAKS Sta. | operate to Fair Oaks; delete service to Vienna |
| R,m | 20/60 | 802 | Centreville - Fair Oaks | Centreville PR, Stone, Paddington, Gothwaite, Billingsgate, Stone, Awbrey Patent, Newton Patent, Braddock, Sully, Centrevillle, New Braddock, Old Clifton, Clifton, Stringfellow, Stringfellow PR, Fair Lakes, Fair Oaks Mall | add peak service |
| R,p | 30/-- | 813 | Fair Oaks - Tysons Galleria | FAIR OAKS Sta., <via I-66 and Capital Beltway>, Leesburg Pike to Tysons Galleria | begin service at Fair Oaks Sta; delete service from Centreville |
| C,p | 30/-- | 814 | Fair Oaks - Franconia/Springfield | FAIR OAKS Sta., <via I-66 and Capital Beltway>, Shirley Hwy, Franconia, Frontier, FRANCONIA/SPRINGFIELD Sta. | begin service at Fair Oaks Sta; delete service from Centreville |
| R,p | 30/-- | 817 | Fair Oaks - Merrifield/Dunn Loring | FAIR OAKS Sta., <via I-66 and Capital Beltway>, Arlington, Gallows, DUNN LORING Sta. | begin service at Fair Oaks Sta; delete service from Centreville |
| C,m | --/60 | 820 | Manassas - Herndon, Local | MANASSAS VRE, Centreville, Walney, Centreville, CHANTILLY Sta., Centreville, Elden, Baron Cameron, Reston Pky, Reston Town Center | serve Chantilly Sta. |
| R,p | 30/-- | 824 | Haymarket/Gainesville - Gov't Center via I-66 | John Marshall Hwy, Lee Hwy, Gainesville PR, <via I-66>, Lee Hwy, Centreville PR, Centreville, <via I-66>, Monument, FAIR OAKS Sta., Government Center | serve Fair Oaks Sta. |
| R,p | 30/-- | **826** | **Haymarket/Gainesville - Tysons Corner via Vienna** | John Marshall Hwy, Lee Hwy, Gainesville PR, <via I-66>, VIENNA Sta., <via I-66 and Capital Beltway>, Leesburg Pike, International, Westpark | **delete; service to Tysons via Routes 860 and 813** |

## Alternative 7B

includes all Enhanced Baseline Alternative routes; route modifications or new routes are noted in the following listing

*new or deleted routes indicated by bold type for route number, route name and comments*

| Service Type | Headway | Route | Name | Description (by street) | Comments |
|---|---|---|---|---|---|
| R,m | 30/30 | 5S | McLearen - Herndon - W. Falls Church via Leesburg Pike | MCLEAREN Sta., McLearen, Centreville, Elden, [ Enhanced Baseline route ] | serve McLearen Sta. |
| F,p | 20/-- | 12EF | Centreville South - Fair Oaks | [ Enhanced Baseline route ], <via I-66>, FAIR OAKS Sta. | terminate route at Fair Oaks; delete service to Vienna |
| F,p | 20/-- | **12LM** | **Little Rocky Run - Fair Oaks** | [ Enhanced Baseline route ], <via I-66>, FAIR OAKS Sta. | **terminate route at Fair Oaks; delete service to Vienna** |
| F,p | 20/-- | **12N** | **Centreville Methodist Church - Fair Oaks** | [ Enhanced Baseline route ], <via I-66>, FAIR OAKS Sta. | **terminate route at Fair Oaks; deleter service to Vienna** |
| F,p | 20/-- | **12R** | **Westfields (Sully Station) - Vienna** | [ same as Enhanced Baseline ] | **delete;replaced by 912** |
| F,p | 20/-- | **12S** | **Carlbern/Oldgate (Sully Station) - Vienna** | [ Enhanced Baseline route from Sully Station] , Stringfellow PR, <via I-66> to VIENNA Sta. | **delete; replaced by 911** |
| F,p | 20/-- | **20A** | **Government Center/Fair Oaks - Tysons Corner via Vienna** | [ same as Enhanced Baseline ] | **delete, replace by Route 920 in Fair Oaks area** |
| F,p | 20/-- | 20F | Chantilly - Franklin Farm - Greenbriar | CHANTILLY Sta., Centreville, Franklin Farm, Fairfax Pky, Stringfellow, Lee Jackson to GREENBRIAR Sta. | truncate route to serve as residential feeder |
| F,p | 20/-- | 20G | Chantilly - Franklin Farm - Greenbriar | CHANTILLY Sta., Centreville, Franklin Farm, Fairfax Pky, Stringfellow, Lee Jackson to GREENBRIAR Sta. | truncate route to serve as residential feeder |
| F,p | 20/-- | 20W | Chantilly - Lafayette Center | [ same as Enhanced Baseline ] | operate to Chantilly Sta. only; delete service to Vienna |
| F,p | 20/-- | 20X | Chantilly - Lafayette Center | [ same as Enhanced Baseline ] | operate to Chantilly Sta. only; delete service to Vienna |
| F,p | 20/-- | **20Y** | **Sullyfield Circle - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 911** |
| F,p | 20/-- | **20Z** | **Sullyfield Circle - Vienna** | [ same as Enhanced Baseline ] | **delete; replaced by Route 911** |
| C,m | 30/60 | 410 | Burke Center PR - Reston/Lake Newport | Burke Centre PR, Roberts Pky, Burke Centre Pky, Fairfax Pky, Ox, University, Main, Lee Hwy, Forum, Government Center, Monument, FAIR OAKS Sta., West Ox, Lawyers, Reston Pky to Leesburg Pike | serve Fair Oaks Sta. |
| F,m | 20/60 | 412 | Reston Baron Cameron - Fair Oaks | Reston Town Center, Reston Pky, Baron Cameron, Elden, Centreville, West Ox, Fairfax Pky, Stringfellow, <via I-66> to FAIR OAKS Sta. | operate to Fair Oaks via I-66; delete segment along Fair Lakes |
| F,p | 20/-- | 413 | Vienna - Route 28/DAAR | FAIR OAKS Sta., <via I-66>, Fairfax Pky, West Ox, Centreville, Coppermine, Horse Pen to Dulles Corner | begin service at Fair Oaks Sta. |
| F,p | 30/-- | 501 | Lawyers Rd - W. Falls Church | Dulles Technology, Fox Mill, Horse Pen, Frying Pan, Sully Road, MCLEAREN Sta., McLearen, Lawyers, Twin Branches, South Lakes, Sunrise Valley, Hunter Mill, <via DAAR>, W. FALLS CHURCH Sta. | serve McLearen Sta. |
| F,p | 30/-- | 593 | Manassas - Fair Oaks | Manassas Park/Centreville, Centreville, Church, Grant, Sudley, Sudley Manor, Williamson, Sudley, NVCC PR, <via I-66>, FAIR OAKS Sta. | operate to Fair Oaks; delete service to Vienna |
| R,m | 20/60 | 802 | Centreville - Fair Oaks | Centreville PR, Stone, Paddington, Gothwaite, Billingsgate, Stone, Awbrey Patent, Newton Patent, Braddock, Sully, Centrevillle, New Braddock, Old Clifton, Clifton, Stringfellow, Stringfellow PR, Fair Lakes, Fair Oaks Mall | add peak service |
| R,p | 30/-- | 813 | Fair Oaks - Tysons Galleria | FAIR OAKS Sta., <via I-66 and Capital Beltway>, Leesburg Pike to Tysons Galleria | begin service at Fair Oaks Sta; delete service from Centreville |
| C,p | 30/-- | 814 | Fair Oaks - Franconia/Springfield | FAIR OAKS Sta., <via I-66 and Capital Beltway>, Shirley Hwy, Franconia, Frontier, FRANCONIA/SPRINGFIELD Sta. | begin service at Fair Oaks Sta; delete service from Centreville |
| R,p | 30/-- | 817 | Fair Oaks - Merrifield/Dunn Loring | FAIR OAKS Sta., <via I-66 and Capital Beltway>, Arlington, Gallows, DUNN LORING Sta. | begin service at Fair Oaks Sta; delete service from Centreville |
| C,m | --/60 | 820 | Manassas - Herndon, Local | MANASSAS VRE, Centreville, Walney, Centreville, CHANTILLY Sta., Centreville, Elden, Baron Cameron, Reston Pky, Reston Town Center | serve Chantilly Sta. |
| R,p | 30/-- | 824 | Haymarket/Gainesville - Gov't Center via I-66 | John Marshall Hwy, Lee Hwy, Gainesville PR, <via I-66>, Lee Hwy, Centreville PR, Centreville, <via I-66>, Monument, FAIR OAKS Sta., Government Center | serve Fair Oaks Sta. |
| R,p | 30/-- | **826** | **Haymarket/Gainesville - Tysons Corner via Vienna** | John Marshall Hwy, Lee Hwy, Gainesville PR, <via I-66>, VIENNA Sta., <via I-66 and Capital Beltway>, Leesburg Pike, International, Westpark | **delete; service to Tysons via Routes 860 and 813** |

# APPENDIX 2

Screenline Daily Traffic Volumes and Peak Hour V/C Ratios

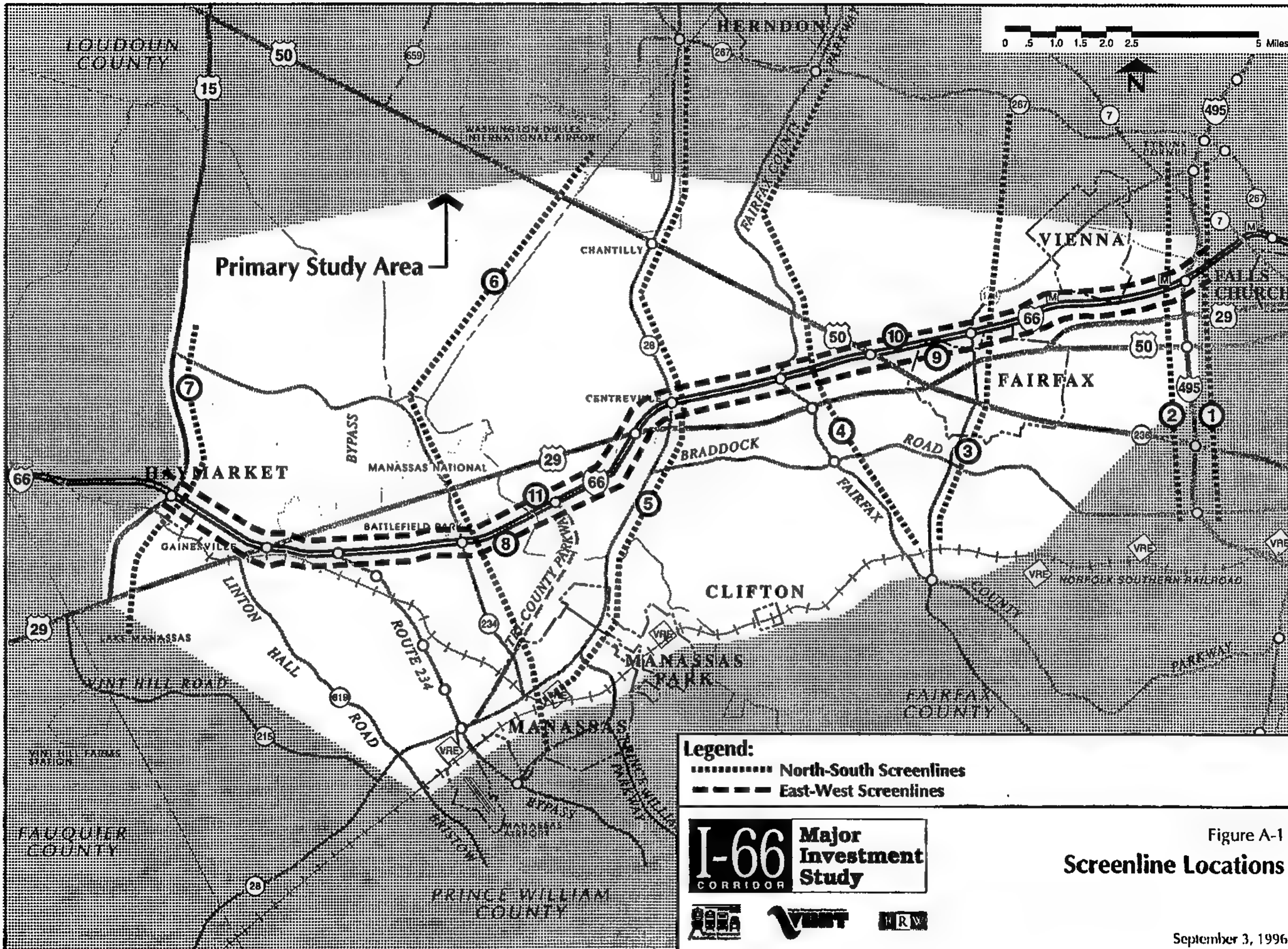



Figure A-1

**Screenline Locations**

September 3, 1996

# Screen Line Summary - Average Daily Traffic (2020)

| Screen Line 1 | | Inside I-495 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| VA 123 | | 122,800 | 122,900 | 122,800 | 124,800 | 122,400 | 121,100 | 122,800 |
| VA 7 | | 86,400 | 86,300 | 86,400 | 85,100 | 86,300 | 86,600 | 87,600 |
| Idylwood Road | | 23,900 | 23,800 | 24,100 | 24,500 | 23,500 | 23,500 | 23,500 |
| I-66 WB | | 50,700 | 50,700 | 51,900 | 54,000 | 51,100 | 51,200 | 50,800 |
| I-66 EB | | 49,800 | 50,100 | 51,700 | 54,300 | 50,500 | 50,700 | 50,800 |
| Shreve Road | | 27,500 | 27,100 | 27,300 | 27,700 | 26,900 | 27,300 | 27,000 |
| US 29 | | 77,100 | 77,000 | 77,000 | 78,300 | 77,200 | 77,100 | 77,100 |
| US 50 | | 119,500 | 119,300 | 119,200 | 121,200 | 118,900 | 119,100 | 119,300 |
| Gallows Road | | 66,000 | 65,900 | 65,800 | 67,500 | 65,500 | 65,500 | 65,700 |
| VA 236 | | 127,300 | 126,700 | 125,700 | 129,000 | 126,800 | 127,800 | 127,100 |
| Braddock Road | | 65,800 | 65,900 | 65,700 | 66,800 | 65,000 | 65,800 | 65,600 |
| Total | Freeway | 100,500 | 100,800 | 103,700 | 108,300 | 101,600 | 101,900 | 101,600 |
| Total | Major Art | 665,000 | 664,100 | 662,600 | 672,600 | 662,200 | 663,000 | 665,100 |
| Total | Other Art | 51,400 | 50,900 | 51,400 | 52,200 | 50,400 | 50,800 | 50,500 |
| Total | Total | 816,900 | 815,800 | 817,700 | 833,000 | 814,100 | 815,700 | 817,200 |

| Screen Line 2 | | Outside I-495 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| VA 123 | | 136,900 | 136,600 | 135,900 | 131,600 | 135,600 | 134,700 | 135,600 |
| VA 7 | | 163,600 | 163,900 | 163,400 | 162,800 | 163,100 | 162,600 | 162,300 |
| Idylwood Road | | 23,400 | 23,300 | 23,600 | 24,100 | 22,800 | 22,900 | 22,900 |
| I-66 EB | | 82,800 | 82,600 | 82,000 | 106,300 | 82,300 | 82,500 | 82,300 |
| I-66 HOV EB | | 5,200 | 5,100 | 9,900 | 5,200 | 5,000 | 5,000 | 5,000 |
| I-66 HOV WB | | 5,900 | 5,800 | 11,100 | 5,800 | 5,800 | 5,800 | 5,800 |
| I-66 WB | | 83,100 | 83,300 | 82,700 | 105,000 | 82,900 | 83,300 | 83,000 |
| US 29 | | 104,200 | 103,700 | 104,000 | 105,600 | 103,600 | 104,000 | 103,700 |
| US 50 | | 121,700 | 121,100 | 120,300 | 119,200 | 121,600 | 121,900 | 121,500 |
| Gallows Road | | 67,700 | 67,300 | 67,700 | 68,200 | 67,400 | 68,400 | 68,600 |
| VA 236 | | 153,600 | 153,500 | 153,100 | 152,100 | 152,800 | 153,000 | 153,200 |
| Braddock Road | | 134,300 | 133,600 | 132,400 | 132,200 | 132,600 | 133,500 | 133,400 |
| Total | Freeway | 177,000 | 176,800 | 185,800 | 222,200 | 176,000 | 176,600 | 176,100 |
| Total | Major Art | 881,900 | 879,700 | 876,800 | 871,700 | 876,900 | 878,100 | 878,300 |
| Total | Other Art | 23,400 | 23,300 | 23,600 | 24,100 | 22,800 | 22,900 | 22,900 |
| Total | Total | 1,082,300 | 1,079,900 | 1,086,100 | 1,118,000 | 1,075,700 | 1,077,600 | 1,077,300 |

Screen Line 3 — Hunter Mill/123 East

| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|---|
| Lawyers Road | | 26,600 | 26,200 | 26,200 | 24,500 | 26,100 | 26,400 | 26,100 |
| Vale Road | | 32,200 | 32,500 | 32,100 | 30,400 | 32,100 | 32,000 | 32,200 |
| VA 123 | | 66,400 | 65,600 | 65,400 | 66,200 | 65,600 | 65,500 | 65,500 |
| Blake Lane | | 41,000 | 40,800 | 40,000 | 41,000 | 40,700 | 40,600 | 40,600 |
| I-66 WB | | 85,500 | 85,200 | 84,600 | 110,400 | 86,100 | 85,600 | 85,900 |
| I-66 HOV WB | | 5,200 | 5,400 | 11,100 | 5,400 | 4,400 | 5,000 | 4,800 |
| I-66 HOV EB | | 4,100 | 3,700 | 9,900 | 4,200 | 4,100 | 4,400 | 4,000 |
| I-66 EB | | 85,800 | 86,200 | 83,900 | 113,700 | 85,300 | 85,500 | 85,800 |
| Eaton Place | | 18,400 | 19,400 | 19,300 | 15,900 | 17,500 | 18,900 | 17,500 |
| US 50 | | 87,100 | 87,200 | 85,600 | 105,500 | 86,000 | 86,700 | 87,100 |
| VA 236 | | 103,600 | 103,600 | 103,100 | 105,800 | 104,500 | 104,000 | 103,400 |
| University Drive | | 19,000 | 18,900 | 19,000 | 18,000 | 19,100 | 18,800 | 19,400 |
| Braddock Road | | 65,100 | 65,000 | 65,000 | 61,000 | 64,600 | 64,600 | 65,200 |
| Zion Drive | | 15,900 | 15,400 | 15,100 | 12,700 | 15,000 | 15,700 | 15,700 |
| New Guinea Road | | 7,000 | 6,800 | 6,300 | 5,400 | 6,900 | 7,100 | 7,100 |
| Total | Freeway | 94,800 | 94,300 | 105,600 | 120,000 | 94,500 | 95,000 | 94,700 |
| Total | Major Art | 407,900 | 407,600 | 402,900 | 452,200 | 406,100 | 406,200 | 406,900 |
| Total | Other Art | 160,100 | 159,900 | 157,900 | 147,800 | 157,300 | 159,400 | 158,600 |
| Total | Total | 662,800 | 661,900 | 666,500 | 720,000 | 657,900 | 660,600 | 660,200 |

| Screen Line 4 | Fairfax County Parkway | | | | | | |
|---|---|---|---|---|---|---|---|
| Location | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Lawyers Road | 9,700 | 8,400 | 8,200 | 6,300 | 9,100 | 9,500 | 9,000 |
| West Ox Road | 16,000 | 15,700 | 15,500 | 13,400 | 15,400 | 15,100 | 16,400 |
| Franklin Farm Road | 11,100 | 10,900 | 10,400 | 8,700 | 10,300 | 10,900 | 9,600 |
| Thompson Road | 2,400 | 2,300 | 2,000 | 1,300 | 2,100 | 2,000 | 3,100 |
| Rugby Road | 22,600 | 22,500 | 22,500 | 20,700 | 22,500 | 22,700 | 23,700 |
| US 50 | 87,900 | 87,400 | 88,000 | 134,000 | 88,100 | 87,400 | 95,100 |
| Monument Drive | 10,100 | 9,800 | 9,100 | 8,700 | 8,400 | 8,600 | 12,300 |
| Fair Lakes Parkway | 35,100 | 34,800 | 33,600 | 29,900 | 34,700 | 34,300 | 31,100 |
| I-66 EB | 87,300 | 87,000 | 87,000 | 91,800 | 87,000 | 87,000 | 85,700 |
| I-66 HOV EB | 4,800 | 4,600 | 8,600 | 3,900 | 4,600 | 4,600 | 4,400 |
| I-66 HOV WB | 5,200 | 5,100 | 10,600 | 5,100 | 5,200 | 5,200 | 5,200 |
| I-66 WB | 80,600 | 80,500 | 79,600 | 83,800 | 80,500 | 80,300 | 79,100 |
| US 29 | 84,400 | 83,400 | 83,600 | 126,100 | 83,700 | 83,900 | 85,200 |
| Braddock Road | 46,100 | 46,200 | 45,000 | 32,600 | 45,300 | 45,400 | 45,900 |
| Popes Head Road | 31,400 | 31,100 | 30,900 | 27,400 | 31,000 | 31,600 | 31,500 |
| Fairfax Station Road | 3,400 | 3,400 | 2,900 | 1,900 | 3,100 | 3,400 | 3,200 |
| Total Freeway | 177,800 | 177,100 | 185,900 | 184,600 | 177,300 | 177,100 | 174,400 |
| Total Major Art | 218,300 | 217,000 | 216,600 | 292,700 | 217,000 | 216,700 | 226,200 |
| Total Other Art | 141,700 | 138,800 | 135,200 | 118,400 | 136,600 | 138,100 | 139,900 |
| Total Total | 537,800 | 532,800 | 537,700 | 595,700 | 531,000 | 532,000 | 540,500 |

| Screen Line 5 | VA 28 | | | | | | |
|---|---|---|---|---|---|---|---|
| Location | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| McLearen | 22,300 | 23,100 | 21,800 | 19,500 | 23,200 | 22,400 | 20,500 |
| US 50 | 95,700 | 95,400 | 93,800 | 117,200 | 95,000 | 94,300 | 109,400 |
| Westfields | 32,400 | 32,000 | 31,300 | 30,900 | 31,500 | 32,000 | 36,200 |
| Poplar Tree | 6,400 | 6,700 | 5,600 | 4,200 | 5,900 | 5,600 | 4,400 |
| I-66 WB | 79,700 | 79,000 | 78,400 | 82,000 | 79,600 | 78,900 | 78,000 |
| I-66 HOV WB | 4,700 | 4,800 | 9,400 | 4,300 | 4,700 | 4,600 | 4,700 |
| I-66 HOV EB | 4,200 | 4,100 | 7,300 | 3,800 | 4,200 | 4,000 | 4,000 |
| I-66 EB | 91,500 | 91,300 | 90,600 | 92,600 | 91,500 | 90,800 | 89,600 |
| US 29 | 64,900 | 64,600 | 53,100 | 95,800 | 64,900 | 53,900 | 60,900 |
| New Braddock Road | 18,800 | 18,300 | 34,400 | 13,300 | 18,000 | 35,400 | 17,700 |
| Compton Road | 46,900 | 46,400 | 44,300 | 41,400 | 45,700 | 44,500 | 45,800 |
| Liberia Avenue | 51,900 | 51,800 | 51,800 | 52,000 | 51,500 | 51,800 | 51,800 |
| Sudley Road | 46,300 | 46,200 | 46,000 | 46,200 | 46,000 | 45,700 | 46,000 |
| Total Freeway | 180,100 | 179,200 | 185,700 | 182,700 | 180,000 | 178,300 | 176,300 |
| Total Major Art | 225,700 | 224,500 | 227,400 | 272,400 | 223,800 | 229,300 | 234,000 |
| Total Other Art | 160,000 | 160,100 | 154,900 | 148,000 | 157,800 | 156,200 | 158,600 |
| Total Total | 565,800 | 563,800 | 567,900 | 603,200 | 561,500 | 563,900 | 568,900 |

| Screen Line 6 | | Loudoun/VA 234 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| US 50 | | 57,200 | 57,100 | 55,500 | 62,700 | 56,800 | 55,600 | 59,900 |
| Braddock Road | | 18,700 | 18,600 | 20,700 | 20,200 | 18,400 | 20,700 | 18,600 |
| Bull Run PO Road | | 11,400 | 11,100 | 11,000 | 10,400 | 11,200 | 11,100 | 10,700 |
| US 29 | | 34,400 | 34,100 | 33,500 | 35,500 | 34,300 | 33,800 | 34,600 |
| I-66 EB | | 58,800 | 58,800 | 59,200 | 61,400 | 58,500 | 59,300 | 58,700 |
| I-66 HOV EB | | 1,600 | 1,700 | 2,000 | 1,800 | 1,500 | 1,600 | 1,600 |
| I-66 HOV WB | | 3,800 | 3,800 | 4,400 | 4,300 | 3,600 | 3,800 | 3,700 |
| I-66 WB | | 58,300 | 58,100 | 58,500 | 60,300 | 58,200 | 58,500 | 58,100 |
| Sudley Manor Drive | | 13,000 | 12,800 | 12,300 | 13,000 | 12,700 | 12,400 | 12,900 |
| Loch Lomond Drive | | 8,300 | 8,100 | 8,000 | 7,700 | 8,100 | 8,200 | 8,100 |
| VA 28 Bypass | | 114,600 | 114,700 | 114,300 | 116,800 | 114,100 | 114,200 | 114,200 |
| VA 28 | | 55,300 | 55,200 | 55,500 | 55,400 | 54,700 | 55,500 | 55,100 |
| Total | Freeway | 122,500 | 122,300 | 124,200 | 127,800 | 121,900 | 123,200 | 122,000 |
| Total | Major Art | 261,500 | 261,100 | 258,800 | 270,300 | 259,900 | 259,200 | 263,700 |
| Total | Other Art | 51,300 | 50,600 | 52,000 | 51,300 | 50,400 | 52,300 | 50,300 |
| Total | Total | 435,300 | 434,000 | 435,000 | 449,400 | 432,200 | 434,700 | 436,000 |

| Screen Line 7 | | US 15 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| VA 234 | | 8,900 | 8,900 | 9,400 | 9,100 | 8,900 | 9,400 | 9,000 |
| I-66 WB | | 36,900 | 36,700 | 36,600 | 37,000 | 36,900 | 36,600 | 36,700 |
| I-66 EB | | 35,500 | 35,400 | 35,100 | 36,000 | 35,400 | 35,200 | 35,400 |
| VA 55 | | 15,700 | 15,500 | 15,300 | 16,000 | 15,500 | 15,500 | 15,500 |
| US 29 | | 35,000 | 35,000 | 35,100 | 35,100 | 35,100 | 35,000 | 35,100 |
| Total | Freeway | 72,500 | 72,100 | 71,700 | 72,900 | 72,300 | 71,800 | 72,200 |
| Total | Major Art | 43,900 | 43,800 | 44,500 | 44,300 | 44,000 | 44,400 | 44,000 |
| Total | Other Art | 15,700 | 15,500 | 15,300 | 16,000 | 15,500 | 15,500 | 15,500 |
| Total | Total | 132,100 | 131,400 | 131,500 | 133,200 | 131,800 | 131,700 | 131,600 |

Screen Line 8 — I-66 North/West End

| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|---|
| US 15 | | 51,000 | 50,800 | 50,300 | 51,300 | 50,700 | 50,100 | 50,800 |
| Catharpin Road | | 2,000 | 2,000 | 1,900 | 1,900 | 2,000 | 1,900 | 1,900 |
| US 29 | | 35,100 | 34,900 | 33,800 | 34,800 | 34,800 | 34,100 | 35,200 |
| VA 234 | | 34,800 | 34,700 | 32,500 | 35,000 | 34,800 | 32,500 | 34,400 |
| Bull Run PO Road | | 18,100 | 17,900 | 14,100 | 18,900 | 17,700 | 13,700 | 17,000 |
| US 29 | | 68,100 | 67,400 | 51,900 | 67,400 | 67,600 | 53,100 | 67,200 |
| VA 28 | | 100,300 | 99,900 | 91,000 | 97,900 | 99,200 | 90,600 | 96,400 |
| Total | Freeway | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | Major Art | 289,200 | 287,600 | 259,500 | 286,300 | 287,100 | 260,400 | 283,900 |
| Total | Other Art | 20,200 | 19,900 | 16,000 | 20,800 | 19,600 | 15,700 | 18,900 |
| Total | Total | 309,400 | 307,500 | 275,500 | 307,200 | 306,700 | 276,100 | 302,900 |

Screen Line 9 — I-66 North/East End

| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|---|
| Stringfellow Road | | 38,600 | 38,400 | 37,300 | 37,400 | 37,400 | 36,600 | 39,000 |
| Fairfax County Parkway | | 92,100 | 92,000 | 91,700 | 88,000 | 91,700 | 91,500 | 92,500 |
| West Ox Road | | 69,700 | 68,600 | 67,900 | 68,000 | 68,200 | 67,200 | 68,100 |
| Monument | | 10,700 | 10,700 | 12,300 | 13,100 | 10,200 | 10,200 | 13,000 |
| US 50 | | 117,700 | 117,200 | 116,800 | 160,400 | 117,100 | 117,100 | 120,200 |
| Waples Mill Road | | 26,900 | 27,600 | 26,700 | 24,400 | 26,400 | 26,800 | 27,500 |
| Jermantown Road | | 27,800 | 27,900 | 27,300 | 28,400 | 27,300 | 27,200 | 28,100 |
| VA 123 | | 56,800 | 56,400 | 56,700 | 64,400 | 57,300 | 57,300 | 56,500 |
| Blake Lane | | 69,900 | 70,000 | 69,800 | 70,900 | 69,600 | 69,700 | 70,300 |
| Nutley Street | | 57,800 | 58,200 | 57,600 | 61,000 | 58,500 | 57,400 | 58,800 |
| Cedar Lane | | 23,200 | 23,200 | 23,500 | 23,400 | 22,600 | 22,600 | 22,500 |
| Gallows Raod | | 50,000 | 50,000 | 50,300 | 51,800 | 50,000 | 49,600 | 50,600 |
| I-495 NB | | 123,000 | 122,100 | 121,600 | 125,300 | 122,400 | 122,400 | 123,400 |
| I-495 HOV NB | | 9,500 | 9,500 | 10,200 | 9,800 | 9,200 | 9,300 | 9,400 |
| I-495 HOV SB | | 9,400 | 9,600 | 10,100 | 9,700 | 9,300 | 9,400 | 9,300 |
| I-495 SB | | 125,400 | 125,300 | 125,200 | 129,200 | 125,200 | 125,200 | 126,100 |
| Total | Freeway | 267,300 | 266,500 | 267,200 | 274,000 | 266,200 | 266,400 | 268,200 |
| Total | Major Art | 266,600 | 265,600 | 265,100 | 312,800 | 266,100 | 265,900 | 269,200 |
| Total | Other Art | 374,700 | 374,600 | 372,700 | 378,400 | 370,200 | 367,400 | 377,900 |
| Total | Total | 908,600 | 906,800 | 905,000 | 965,100 | 902,500 | 899,700 | 915,300 |

| Screen Line 10 | | I-66 South/West End | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| US 15 | | 37,900 | 37,700 | 37,400 | 38,000 | 37,500 | 37,700 | 37,400 |
| Catharpin Road | | 2,000 | 2,000 | 1,900 | 1,900 | 2,000 | 1,900 | 1,900 |
| US 29 | | 76,500 | 76,300 | 76,200 | 76,700 | 76,300 | 76,000 | 76,100 |
| VA 234 Bypass | | 45,600 | 45,500 | 45,100 | 46,200 | 44,600 | 45,800 | 45,400 |
| VA 234 | | 69,600 | 69,500 | 69,800 | 70,600 | 69,400 | 69,300 | 69,500 |
| Bull Run PO Road | | 18,100 | 17,900 | 14,100 | 18,900 | 17,700 | 13,700 | 17,000 |
| VA 28 Bypass/Godwin D | | 94,700 | 94,900 | 93,500 | 96,200 | 94,400 | 93,200 | 94,000 |
| US 29 | | 58,500 | 58,600 | 44,500 | 64,300 | 57,600 | 45,100 | 58,400 |
| VA 28 | | 82,300 | 81,400 | 77,800 | 75,400 | 81,300 | 78,100 | 78,100 |
| Total | Freeway | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | Major Art | 465,000 | 463,900 | 444,200 | 467,300 | 461,100 | 445,100 | 458,900 |
| Total | Other Art | 20,200 | 19,900 | 16,000 | 20,800 | 19,600 | 15,700 | 18,900 |
| Total | Total | 485,100 | 483,800 | 460,200 | 488,100 | 480,800 | 460,800 | 477,800 |

| Screen Line 11 | | I-66 South/East End | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,29 | 6C-LRT 50/28 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
| Stringfellow Road | | 39,000 | 38,600 | 37,100 | 37,400 | 37,500 | 36,800 | 39,400 |
| Fairfax County Parkway | | 75,800 | 76,600 | 73,400 | 68,100 | 75,300 | 74,000 | 77,400 |
| West Ox Road | | 55,100 | 53,500 | 53,400 | 52,700 | 53,600 | 53,200 | 55,300 |
| Monument Drive | | 6,900 | 6,500 | 6,700 | 8,800 | 6,500 | 6,900 | 9,300 |
| US 50 | | 120,400 | 120,300 | 120,100 | 139,900 | 120,100 | 119,300 | 119,700 |
| Waples Mill Road | | 26,900 | 27,600 | 26,700 | 24,400 | 26,400 | 26,800 | 27,500 |
| Jermantown | | 27,800 | 27,900 | 27,300 | 28,400 | 27,300 | 27,200 | 28,100 |
| VA 123 | | 56,900 | 57,700 | 58,400 | 73,700 | 56,900 | 59,000 | 56,600 |
| Blake Lane | | 69,900 | 70,000 | 69,800 | 70,900 | 69,600 | 69,700 | 70,300 |
| Nutley Street | | 57,800 | 58,400 | 57,400 | 60,300 | 57,000 | 57,500 | 58,200 |
| Cedar Lane | | 25,900 | 25,900 | 26,200 | 26,400 | 25,100 | 25,300 | 25,000 |
| Gallows Road | | 52,600 | 52,600 | 52,900 | 54,700 | 52,400 | 52,200 | 53,100 |
| I-495 SB | | 111,200 | 111,400 | 111,100 | 115,800 | 110,900 | 110,700 | 111,600 |
| I-495 HOV SB | | 7,900 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,700 |
| I-495 HOV NB | | 9,500 | 9,500 | 9,700 | 9,500 | 9,400 | 9,400 | 9,500 |
| I-495 NB | | 107,200 | 107,200 | 107,500 | 110,100 | 107,100 | 107,200 | 108,600 |
| Total | Freeway | 235,800 | 235,900 | 236,200 | 243,200 | 235,200 | 235,000 | 237,500 |
| Total | Major Art | 253,100 | 254,600 | 252,000 | 281,700 | 252,400 | 252,200 | 253,700 |
| Total | Other Art | 361,900 | 361,100 | 357,500 | 363,900 | 355,200 | 355,600 | 366,200 |
| Total | Total | 850,800 | 851,600 | 845,700 | 888,800 | 842,800 | 842,900 | 857,400 |

# Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 1 Inside I-495

| Location | | 1-Baseline Scenario | 2-Enhanced Baseline | 3C-Barrier Sep. HOV | 4C-Upgrade I-66,RT50,2 | 6C-LRT 50/2 +Manassas | 7A-Metro Centreville | 7B-Metro RT 50/28 |
|---|---|---|---|---|---|---|---|---|
| VA 123 EB | | 1.18 | 1.18 | 1.19 | 1.23 | 1.20 | 1.19 | 1.18 |
| VA 123 WB | | 1.13 | 1.12 | 1.17 | 1.20 | 1.13 | 1.11 | 1.12 |
| VA 7 EB | | 1.60 | 1.61 | 1.60 | 1.63 | 1.62 | 1.60 | 1.60 |
| VA 7 WB | | 1.61 | 1.63 | 1.64 | 1.68 | 1.63 | 1.63 | 1.64 |
| Idylwood Road EB | | 1.08 | 1.10 | 1.15 | 1.20 | 1.09 | 1.09 | 1.12 |
| Idylwood Road WB | | 1.18 | 1.17 | 1.17 | 1.23 | 1.17 | 1.17 | 1.17 |
| I-66 EB | | 1.14 | 1.15 | 1.15 | 1.24 | 1.16 | 1.16 | 1.16 |
| I-66 WB | | 1.14 | 1.15 | 1.28 | 1.19 | 1.14 | 1.15 | 1.14 |
| Shreve Road EB | | 1.12 | 1.10 | 1.13 | 1.15 | 1.12 | 1.18 | 1.10 |
| Shreve Road WB | | 1.37 | 1.30 | 1.28 | 1.42 | 1.28 | 1.35 | 1.35 |
| US 29 EB | | 1.43 | 1.44 | 1.46 | 1.45 | 1.46 | 1.43 | 1.46 |
| US 29 WB | | 1.63 | 1.65 | 1.65 | 1.70 | 1.63 | 1.64 | 1.63 |
| US 50 EB | | 1.61 | 1.61 | 1.61 | 1.65 | 1.61 | 1.59 | 1.62 |
| US 50 WB | | 1.34 | 1.34 | 1.34 | 1.38 | 1.36 | 1.34 | 1.36 |
| Gallows Road SB | | 1.29 | 1.31 | 1.30 | 1.33 | 1.31 | 1.30 | 1.31 |
| Gallows Road NB | | 1.54 | 1.53 | 1.53 | 1.55 | 1.51 | 1.51 | 1.52 |
| VA 236 EB | | 1.56 | 1.56 | 1.55 | 1.57 | 1.55 | 1.57 | 1.55 |
| VA 236 WB | | 1.73 | 1.72 | 1.70 | 1.76 | 1.69 | 1.71 | 1.69 |
| Braddock Road EB | | 1.39 | 1.39 | 1.37 | 1.40 | 1.37 | 1.40 | 1.38 |
| Braddock Road WB | | 1.41 | 1.41 | 1.39 | 1.43 | 1.40 | 1.44 | 1.40 |
| Total | Freeway | 1.14 | 1.15 | 1.21 | 1.22 | 1.15 | 1.15 | 1.15 |
| Total | Major Art | 1.44 | 1.44 | 1.44 | 1.48 | 1.44 | 1.44 | 1.44 |
| Total | Other Art | 1.19 | 1.17 | 1.18 | 1.25 | 1.17 | 1.20 | 1.19 |
| Total | Total | 1.38 | 1.38 | 1.39 | 1.42 | 1.38 | 1.38 | 1.38 |

# Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 2 Outside I-495

| Location | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| VA 123 EB | | 1.44 | 1.42 | 1.44 | 1.42 | 1.44 | 1.42 | 1.43 |
| VA 123 WB | | 1.00 | 1.00 | 0.98 | 0.98 | 0.99 | 0.98 | 1.00 |
| VA 7 EB | | 1.72 | 1.77 | 1.76 | 1.73 | 1.77 | 1.73 | 1.74 |
| VA 7 WB | | 1.22 | 1.24 | 1.22 | 1.24 | 1.24 | 1.22 | 1.23 |
| Idylwood Road EB | | 1.05 | 1.07 | 1.13 | 1.18 | 1.07 | 1.06 | 1.10 |
| Idylwood Road WB | | 1.14 | 1.14 | 1.13 | 1.21 | 1.14 | 1.14 | 1.14 |
| I-66 EB | | 1.24 | 1.24 | 1.25 | 1.20 | 1.24 | 1.24 | 1.24 |
| I-66 HOV EB | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| I-66 HOV WB | | 1.26 | 1.26 | 1.20 | 1.24 | 1.24 | 1.25 | 1.24 |
| I-66 WB | | 1.22 | 1.22 | 1.17 | 1.19 | 1.20 | 1.22 | 1.21 |
| US 29 EB | | 1.29 | 1.29 | 1.31 | 1.31 | 1.30 | 1.30 | 1.31 |
| US 29 WB | | 1.50 | 1.49 | 1.49 | 1.56 | 1.47 | 1.50 | 1.49 |
| US 50 EB | | 1.57 | 1.56 | 1.59 | 1.57 | 1.57 | 1.56 | 1.56 |
| US 50 WB | | 1.46 | 1.44 | 1.43 | 1.49 | 1.47 | 1.44 | 1.43 |
| Gallows Road SB | | 1.47 | 1.47 | 1.51 | 1.44 | 1.46 | 1.54 | 1.50 |
| Gallows Road NB | | 1.66 | 1.63 | 1.62 | 1.62 | 1.64 | 1.62 | 1.65 |
| VA 236 EB | | 1.43 | 1.44 | 1.46 | 1.45 | 1.46 | 1.44 | 1.46 |
| VA 236 WB | | 1.62 | 1.62 | 1.61 | 1.65 | 1.61 | 1.63 | 1.63 |
| Braddock Road EB | | 1.62 | 1.62 | 1.63 | 1.62 | 1.61 | 1.63 | 1.63 |
| Braddock Road WB | | 2.17 | 2.15 | 2.08 | 2.20 | 2.08 | 2.14 | 2.13 |
| Total | Freeway | 1.08 | 1.08 | 1.07 | 1.08 | 1.07 | 1.08 | 1.07 |
| Total | Major Art | 1.49 | 1.49 | 1.49 | 1.50 | 1.49 | 1.49 | 1.49 |
| Total | Other Art | 1.10 | 1.11 | 1.13 | 1.19 | 1.11 | 1.10 | 1.12 |
| Total | Total | 1.40 | 1.40 | 1.39 | 1.39 | 1.39 | 1.39 | 1.40 |

# Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 3 Hunter Mill/123 East

| Location | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lawyers Road EB | 1.07 | 1.08 | 1.08 | 1.04 | 1.08 | 1.07 | 1.07 |
| Lawyers Road WB | 1.19 | 1.19 | 1.17 | 1.19 | 1.18 | 1.18 | 1.19 |
| Vale Road EB | 1.11 | 1.13 | 1.10 | 1.15 | 1.14 | 1.10 | 1.11 |
| Vale Road WB | 1.24 | 1.27 | 1.21 | 1.30 | 1.26 | 1.21 | 1.23 |
| VA 123 EB | 1.17 | 1.11 | 1.17 | 1.15 | 1.17 | 1.12 | 1.13 |
| VA 123 WB | 1.24 | 1.18 | 1.19 | 1.27 | 1.22 | 1.20 | 1.19 |
| Blake Lane EB | 0.91 | 1.02 | 0.93 | 1.00 | 0.92 | 0.94 | 0.97 |
| Blake Lane WB | 1.04 | 1.05 | 0.97 | 1.13 | 1.00 | 1.00 | 1.03 |
| I-66 EB | 1.24 | 1.24 | 1.25 | 1.24 | 1.25 | 1.25 | 1.24 |
| I-66 HOV EB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| I-66 HOV WB | 1.12 | 1.17 | 1.20 | 1.16 | 0.94 | 1.08 | 1.03 |
| I-66 WB | 1.39 | 1.36 | 1.31 | 1.38 | 1.43 | 1.39 | 1.40 |
| Eaton Place EB | 1.07 | 1.09 | 1.09 | 1.00 | 1.10 | 1.12 | 1.09 |
| Eaton Place WB | 1.21 | 1.18 | 1.18 | 1.24 | 1.31 | 1.19 | 1.18 |
| US 50 EB | 1.04 | 0.98 | 1.00 | 1.15 | 1.04 | 1.03 | 1.00 |
| US 50 WB | 1.18 | 1.15 | 1.13 | 1.29 | 1.14 | 1.16 | 1.13 |
| VA 236 EB | 1.16 | 1.20 | 1.21 | 1.28 | 1.20 | 1.19 | 1.21 |
| VA 236 WB | 1.22 | 1.26 | 1.23 | 1.41 | 1.24 | 1.24 | 1.26 |
| University Drive EB | 0.86 | 0.85 | 0.91 | 0.91 | 0.87 | 0.85 | 0.91 |
| University Drive WB | 1.01 | 0.99 | 1.02 | 1.12 | 0.99 | 1.02 | 1.05 |
| Braddock Road EB | 1.24 | 1.24 | 1.28 | 1.19 | 1.27 | 1.26 | 1.28 |
| Braddock Road WB | 1.38 | 1.37 | 1.36 | 1.42 | 1.39 | 1.37 | 1.40 |
| Zion Drive EB | 0.89 | 0.88 | 0.93 | 0.71 | 0.89 | 0.90 | 0.94 |
| Zion Drive WB | 1.04 | 1.05 | 1.03 | 0.93 | 1.02 | 1.03 | 1.05 |
| New Guinea Road EB | 0.34 | 0.34 | 0.31 | 0.24 | 0.33 | 0.35 | 0.33 |
| New Guinea Road WB | 0.73 | 0.69 | 0.65 | 0.60 | 0.74 | 0.75 | 0.75 |
| Total Freeway | 1.06 | 1.05 | 1.05 | 1.12 | 1.04 | 1.05 | 1.04 |
| Total Major Art | 1.20 | 1.19 | 1.20 | 1.26 | 1.21 | 1.20 | 1.19 |
| Total Other Art | 0.93 | 0.94 | 0.92 | 0.93 | 0.94 | 0.93 | 0.95 |
| Total Total | 1.09 | 1.08 | 1.08 | 1.13 | 1.09 | 1.09 | 1.09 |

# Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 4 Fairfax County Parkway

| Location | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lawyers Road EB | 0.42 | 0.36 | 0.37 | 0.32 | 0.41 | 0.42 | 0.37 |
| Lawyers Road WB | 0.40 | 0.34 | 0.32 | 0.33 | 0.32 | 0.41 | 0.30 |
| West Ox Road SB | 0.96 | 0.96 | 0.90 | 0.93 | 0.88 | 0.86 | 0.82 |
| West Ox Road NB | 0.68 | 0.67 | 0.72 | 0.63 | 0.73 | 0.67 | 0.65 |
| Franklin Farm Road EB | 0.70 | 0.70 | 0.68 | 0.72 | 0.62 | 0.69 | 0.76 |
| Franklin Farm Road WB | 0.62 | 0.68 | 0.61 | 0.63 | 0.68 | 0.65 | 0.67 |
| Thompson Road EB | 0.26 | 0.21 | 0.24 | 0.26 | 0.27 | 0.20 | 0.35 |
| Thompson Road WB | 0.27 | 0.29 | 0.17 | 0.09 | 0.19 | 0.23 | 0.54 |
| Rugby Road EB | 1.09 | 1.11 | 1.10 | 1.08 | 1.09 | 1.10 | 1.13 |
| Rugby Road WB | 1.08 | 1.08 | 1.09 | 1.10 | 1.07 | 1.06 | 1.11 |
| US 50 EB | 1.04 | 1.04 | 1.06 | 1.16 | 1.06 | 1.03 | 1.13 |
| US 50 WB | 1.12 | 1.10 | 1.10 | 1.20 | 1.11 | 1.10 | 1.15 |
| Monument Drive EB | 0.48 | 0.45 | 0.48 | 0.40 | 0.42 | 0.45 | 0.52 |
| Monument Drive WB | 0.92 | 0.84 | 0.81 | 0.70 | 0.79 | 0.75 | 0.84 |
| Fair Lakes Parkway EB | 0.70 | 0.71 | 0.72 | 0.69 | 0.71 | 0.74 | 0.64 |
| Fair Lakes Parkway WB | 1.04 | 1.05 | 0.97 | 0.97 | 1.02 | 1.01 | 0.99 |
| I-66 EB | 0.96 | 0.95 | 0.98 | 0.97 | 0.98 | 0.97 | 0.95 |
| I-66 HOV EB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| I-66 HOV WB | 1.12 | 1.09 | 1.15 | 1.10 | 1.13 | 1.13 | 1.11 |
| I-66 WB | 1.20 | 1.21 | 1.16 | 1.13 | 1.18 | 1.18 | 1.18 |
| US 29 EB | 1.32 | 1.32 | 1.36 | 1.02 | 1.31 | 1.30 | 1.30 |
| US 29 WB | 2.33 | 2.27 | 2.23 | 1.55 | 2.30 | 2.30 | 2.36 |
| Braddock Road EB | 0.81 | 0.82 | 0.81 | 0.81 | 0.79 | 0.80 | 0.81 |
| Braddock Road WB | 1.16 | 1.16 | 1.12 | 1.05 | 1.14 | 1.13 | 1.16 |
| Popes Head Road EB | 1.49 | 1.52 | 1.65 | 1.47 | 1.51 | 1.57 | 1.64 |
| Popes Head Road WB | 1.81 | 1.79 | 1.65 | 2.17 | 1.70 | 1.76 | 1.82 |
| Fairfax Station Road EB | 0.34 | 0.44 | 0.42 | 0.09 | 0.43 | 0.50 | 0.36 |
| Fairfax Station Road WB | 1.25 | 1.24 | 1.07 | 0.90 | 1.18 | 1.20 | 1.24 |
| Total Freeway | 0.95 | 0.95 | 0.97 | 0.95 | 0.95 | 0.95 | 0.94 |
| Total Major Art | 1.27 | 1.26 | 1.26 | 1.17 | 1.27 | 1.25 | 1.30 |
| Total Other Art | 0.75 | 0.74 | 0.72 | 0.69 | 0.72 | 0.73 | 0.75 |
| Total Total | 0.96 | 0.95 | 0.95 | 0.94 | 0.95 | 0.95 | 0.97 |

## Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 5 VA 28

| Location | | | | | | | |
|---|---|---|---|---|---|---|---|
| McLearen EB | 0.33 | 0.43 | 0.30 | 0.28 | 0.40 | 0.37 | 0.34 |
| McLearen WB | 0.65 | 0.73 | 0.58 | 0.51 | 0.73 | 0.63 | 0.62 |
| US 50 EB | 1.05 | 1.05 | 1.04 | 1.04 | 1.04 | 1.03 | 1.17 |
| US 50 WB | 1.17 | 1.16 | 1.11 | 1.11 | 1.13 | 1.12 | 1.28 |
| Westfields EB | 0.60 | 0.58 | 0.60 | 0.52 | 0.59 | 0.60 | 0.63 |
| Westfields WB | 0.92 | 0.92 | 0.90 | 0.88 | 0.91 | 0.96 | 0.96 |
| Poplar Tree EB | 0.34 | 0.36 | 0.33 | 0.26 | 0.28 | 0.30 | 0.27 |
| Poplar Tree WB | 0.68 | 0.75 | 0.51 | 0.47 | 0.62 | 0.57 | 0.56 |
| I-66 EB | 0.99 | 0.99 | 1.00 | 0.96 | 1.01 | 0.99 | 0.96 |
| I-66 HOV EB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| I-66 HOV WB | 1.01 | 1.04 | 1.01 | 0.92 | 1.02 | 1.00 | 1.01 |
| I-66 WB | 1.13 | 1.11 | 1.10 | 1.06 | 1.11 | 1.11 | 1.11 |
| US 29 EB | 1.30 | 1.27 | 1.16 | 1.03 | 1.29 | 1.12 | 1.28 |
| US 29 WB | 1.30 | 1.27 | 1.09 | 1.07 | 1.28 | 1.16 | 1.27 |
| New Braddock Road EB | 0.35 | 0.34 | 0.73 | 0.25 | 0.34 | 0.78 | 0.35 |
| New Braddock Road WB | 0.62 | 0.59 | 0.86 | 0.48 | 0.60 | 0.93 | 0.54 |
| Compton Road EB | 1.94 | 1.91 | 1.77 | 1.76 | 1.97 | 1.73 | 1.93 |
| Compton Road WB | 3.40 | 3.32 | 2.92 | 3.00 | 3.13 | 3.07 | 3.23 |
| Liberia Avenue EB | 1.18 | 1.16 | 1.17 | 1.19 | 1.18 | 1.15 | 1.17 |
| Liberia Avenue WB | 1.07 | 1.07 | 1.07 | 1.06 | 1.06 | 1.06 | 1.07 |
| Sudley Road EB | 1.05 | 1.04 | 1.05 | 1.04 | 1.04 | 1.05 | 1.04 |
| Sudley Road WB | 0.88 | 0.87 | 0.87 | 0.87 | 0.87 | 0.86 | 0.87 |
| Total Freeway | 0.93 | 0.93 | 0.93 | 0.90 | 0.93 | 0.92 | 0.91 |
| Total Major Art | 0.99 | 0.98 | 1.00 | 0.93 | 0.98 | 1.02 | 1.01 |
| Total Other Art | 1.00 | 1.02 | 0.93 | 0.91 | 0.99 | 0.96 | 0.98 |
| Total Total | 0.98 | 0.98 | 0.96 | 0.92 | 0.97 | 0.97 | 0.97 |

# Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

| Screen Line 6 | Loudoun/VA 234 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | | | | | | | | |
| US 50 EB | | 0.86 | 0.86 | 0.82 | 0.93 | 0.85 | 0.84 | 0.88 |
| US 50 WB | | 1.28 | 1.28 | 1.28 | 1.34 | 1.28 | 1.27 | 1.30 |
| Braddock Road EB | | 0.95 | 0.95 | 0.96 | 1.00 | 0.93 | 0.94 | 0.97 |
| Braddock Road WB | | 1.47 | 1.51 | 1.59 | 1.58 | 1.51 | 1.60 | 1.53 |
| Bull Run PO Road SB | | 0.95 | 0.92 | 0.98 | 0.84 | 0.91 | 1.00 | 0.91 |
| Bull Run PO Road NB | | 0.74 | 0.68 | 0.70 | 0.65 | 0.72 | 0.72 | 0.67 |
| US 29 EB | | 0.89 | 0.89 | 0.85 | 0.93 | 0.89 | 0.86 | 0.89 |
| US 29 WB | | 0.97 | 0.96 | 0.95 | 1.02 | 0.96 | 0.95 | 0.96 |
| I-66 EB | | 0.58 | 0.58 | 0.60 | 0.60 | 0.58 | 0.60 | 0.58 |
| I-66 HOV EB | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| I-66 HOV WB | | 0.75 | 0.75 | 0.44 | 0.86 | 0.71 | 0.76 | 0.73 |
| I-66 WB | | 0.81 | 0.81 | 0.81 | 0.88 | 0.81 | 0.82 | 0.81 |
| Sudley Manor Drive EB | | 0.31 | 0.31 | 0.31 | 0.34 | 0.32 | 0.30 | 0.32 |
| Sudley Manor Drive WB | | 0.59 | 0.59 | 0.55 | 0.64 | 0.56 | 0.56 | 0.59 |
| Loch Lomond Drive EB | | 0.46 | 0.45 | 0.44 | 0.42 | 0.45 | 0.46 | 0.44 |
| Loch Lomond Drive WB | | 0.40 | 0.33 | 0.31 | 0.32 | 0.40 | 0.36 | 0.40 |
| VA 28 Bypass NB | | 0.92 | 0.91 | 0.90 | 0.94 | 0.91 | 0.90 | 0.91 |
| VA 28 Bypass SB | | 1.14 | 1.14 | 1.14 | 1.16 | 1.14 | 1.14 | 1.14 |
| VA 28 NB | | 1.07 | 1.07 | 1.07 | 1.07 | 1.06 | 1.07 | 1.07 |
| VA 28 SB | | 1.24 | 1.23 | 1.24 | 1.24 | 1.23 | 1.24 | 1.23 |
| Total | Freeway | 0.61 | 0.61 | 0.57 | 0.66 | 0.61 | 0.62 | 0.61 |
| Total | Major Art | 1.05 | 1.04 | 1.04 | 1.08 | 1.04 | 1.04 | 1.05 |
| Total | Other Art | 0.67 | 0.66 | 0.66 | 0.67 | 0.66 | 0.67 | 0.67 |
| Total | Total | 0.83 | 0.82 | 0.80 | 0.85 | 0.82 | 0.82 | 0.82 |

| Screen Line 7 | US 15 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location | | | | | | | | |
| VA 234 EB | | 0.38 | 0.37 | 0.41 | 0.38 | 0.37 | 0.42 | 0.37 |
| VA 234 WB | | 0.39 | 0.41 | 0.43 | 0.41 | 0.40 | 0.43 | 0.42 |
| I-66 EB | | 0.80 | 0.81 | 0.81 | 0.81 | 0.81 | 0.80 | 0.80 |
| I-66 WB | | 0.87 | 0.86 | 0.86 | 0.87 | 0.87 | 0.87 | 0.86 |
| VA 55 EB | | 0.86 | 0.81 | 0.76 | 0.87 | 0.82 | 0.81 | 0.79 |
| VA 55 WB | | 1.26 | 1.22 | 1.26 | 1.26 | 1.23 | 1.22 | 1.24 |
| US 29 EB | | 0.37 | 0.36 | 0.37 | 0.37 | 0.37 | 0.36 | 0.37 |
| US 29 WB | | 0.33 | 0.33 | 0.33 | 0.33 | 0.34 | 0.34 | 0.33 |
| Total | Freeway | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.83 | 0.83 |
| Total | Major Art | 0.36 | 0.36 | 0.37 | 0.36 | 0.36 | 0.37 | 0.37 |
| Total | Other Art | 1.06 | 1.01 | 1.01 | 1.07 | 1.03 | 1.01 | 1.01 |
| Total | Total | 0.63 | 0.62 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 |

## Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 8 — I-66 North/West End

| Location | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| US 15 SB | | 0.82 | 0.82 | 0.80 | 0.84 | 0.81 | 0.80 | 0.81 |
| US 15 NB | | 1.04 | 1.04 | 1.04 | 1.05 | 1.04 | 1.03 | 1.04 |
| Catharpin Road SB | | 0.23 | 0.22 | 0.20 | 0.21 | 0.22 | 0.23 | 0.21 |
| Catharpin Road NB | | 0.11 | 0.10 | 0.10 | 0.10 | 0.11 | 0.09 | 0.10 |
| US 29 SB | | 0.85 | 0.84 | 0.80 | 0.87 | 0.86 | 0.81 | 0.84 |
| US 29 NB | | 0.83 | 0.83 | 0.76 | 0.86 | 0.82 | 0.75 | 0.80 |
| VA 234 SB | | 1.35 | 1.34 | 1.28 | 1.36 | 1.36 | 1.25 | 1.34 |
| VA 234 NB | | 1.16 | 1.15 | 1.09 | 1.18 | 1.15 | 1.08 | 1.14 |
| Bull Run PO Road SB | | 1.46 | 1.42 | 1.29 | 1.49 | 1.45 | 1.21 | 1.43 |
| Bull Run PO Road NB | | 1.29 | 1.27 | 0.98 | 1.31 | 1.26 | 0.98 | 1.25 |
| US 29 SB | | 1.27 | 1.27 | 1.03 | 1.21 | 1.28 | 1.05 | 1.28 |
| US 29 NB | | 1.30 | 1.29 | 1.04 | 1.38 | 1.29 | 1.05 | 1.29 |
| VA 28 SB | | 1.78 | 1.77 | 1.59 | 1.70 | 1.77 | 1.64 | 1.74 |
| VA 28 NB | | 1.20 | 1.20 | 1.14 | 1.28 | 1.19 | 1.09 | 1.18 |
| Total | Freeway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | Major Art | 1.17 | 1.17 | 1.07 | 1.19 | 1.17 | 1.07 | 1.16 |
| Total | Other Art | 0.82 | 0.80 | 0.68 | 0.83 | 0.80 | 0.66 | 0.79 |
| Total | Total | 1.13 | 1.12 | 1.02 | 1.14 | 1.12 | 1.01 | 1.11 |

## Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 9 I-66 North/East End

| Location | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Stringfellow Road SB | | 0.92 | 0.94 | 0.88 | 0.88 | 0.89 | 0.87 | 0.92 |
| Stringfellow Road NB | | 0.86 | 0.88 | 0.85 | 0.88 | 0.87 | 0.83 | 0.89 |
| Fairfax County Parkway SB | | 1.65 | 1.66 | 1.62 | 1.62 | 1.65 | 1.62 | 1.67 |
| Fairfax County Parkway NB | | 1.52 | 1.54 | 1.53 | 1.45 | 1.53 | 1.52 | 1.53 |
| West Ox Road SB | | 1.12 | 1.11 | 1.09 | 1.12 | 1.12 | 1.09 | 1.11 |
| West Ox Road NB | | 1.03 | 1.06 | 1.03 | 1.04 | 1.02 | 0.99 | 1.04 |
| Monument EB | | 0.42 | 0.40 | 0.55 | 0.58 | 0.40 | 0.42 | 0.47 |
| Monument WB | | 0.55 | 0.53 | 0.61 | 0.74 | 0.53 | 0.50 | 0.52 |
| US 50 EB | | 1.30 | 1.30 | 1.29 | 1.36 | 1.30 | 1.31 | 1.34 |
| US 50 WB | | 1.50 | 1.47 | 1.46 | 1.44 | 1.47 | 1.46 | 1.49 |
| Waples Mill Road SB | | 1.12 | 1.14 | 1.12 | 1.24 | 1.13 | 1.10 | 1.15 |
| Waples Mill Road NB | | 1.23 | 1.24 | 1.26 | 1.23 | 1.22 | 1.21 | 1.25 |
| Jermantown Road SB | | 1.19 | 1.22 | 1.17 | 1.37 | 1.23 | 1.22 | 1.21 |
| Jermantown Road NB | | 1.17 | 1.25 | 1.21 | 1.37 | 1.22 | 1.24 | 1.24 |
| VA 123 SB | | 1.13 | 1.19 | 1.21 | 1.37 | 1.16 | 1.18 | 1.21 |
| VA 123 NB | | 1.15 | 1.23 | 1.25 | 1.37 | 1.20 | 1.22 | 1.22 |
| Blake Lane SB | | 1.34 | 1.38 | 1.38 | 1.54 | 1.36 | 1.36 | 1.40 |
| Blake Lane NB | | 1.50 | 1.50 | 1.51 | 1.75 | 1.50 | 1.50 | 1.52 |
| Nutley Street SB | | 1.25 | 1.27 | 1.27 | 1.49 | 1.25 | 1.24 | 1.29 |
| Nutley Street NB | | 1.14 | 1.16 | 1.12 | 1.27 | 1.15 | 1.15 | 1.18 |
| Cedar Lane SB | | 1.17 | 1.20 | 1.18 | 1.18 | 1.16 | 1.17 | 1.19 |
| Cedar Lane NB | | 1.13 | 1.14 | 1.16 | 1.16 | 1.14 | 1.12 | 1.14 |
| Gallows Road SB | | 1.16 | 1.17 | 1.17 | 1.23 | 1.15 | 1.15 | 1.16 |
| Gallows Road NB | | 1.13 | 1.14 | 1.14 | 1.14 | 1.13 | 1.12 | 1.13 |
| I-495 SB | | 1.48 | 1.48 | 1.52 | 1.57 | 1.48 | 1.47 | 1.49 |
| I-495 HOV SB | | 1.38 | 1.38 | 1.47 | 1.41 | 1.36 | 1.37 | 1.37 |
| I-495 HOV NB | | 1.19 | 1.19 | 1.15 | 1.21 | 1.17 | 1.17 | 1.19 |
| I-495 NB | | 1.23 | 1.22 | 1.22 | 1.27 | 1.23 | 1.23 | 1.23 |
| Total | Freeway | 1.34 | 1.34 | 1.36 | 1.40 | 1.34 | 1.34 | 1.34 |
| Total | Major Art | 1.38 | 1.40 | 1.39 | 1.43 | 1.39 | 1.39 | 1.41 |
| Total | Other Art | 1.07 | 1.08 | 1.08 | 1.16 | 1.07 | 1.05 | 1.09 |
| Total | Total | 1.21 | 1.22 | 1.22 | 1.29 | 1.21 | 1.20 | 1.23 |

# Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 10 I-66 South/West End

| Location | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| US 15 SB | | 0.73 | 0.72 | 0.70 | 0.74 | 0.71 | 0.71 | 0.70 |
| US 15 NB | | 0.79 | 0.79 | 0.79 | 0.79 | 0.78 | 0.79 | 0.78 |
| Catharpin Road SB | | 0.23 | 0.22 | 0.20 | 0.21 | 0.22 | 0.23 | 0.21 |
| Catharpin Road NB | | 0.11 | 0.10 | 0.10 | 0.10 | 0.11 | 0.09 | 0.10 |
| US 29 SB | | 1.12 | 1.12 | 1.12 | 1.13 | 1.12 | 1.11 | 1.11 |
| US 29 NB | | 1.07 | 1.07 | 1.06 | 1.06 | 1.07 | 1.05 | 1.07 |
| VA 234 Bypass SB | | 0.56 | 0.56 | 0.56 | 0.60 | 0.54 | 0.56 | 0.57 |
| VA 234 Bypass NB | | 0.41 | 0.41 | 0.39 | 0.40 | 0.40 | 0.41 | 0.41 |
| VA 234 SB | | 1.36 | 1.34 | 1.37 | 1.38 | 1.35 | 1.36 | 1.34 |
| VA 234 NB | | 1.18 | 1.17 | 1.19 | 1.19 | 1.18 | 1.18 | 1.18 |
| Bull Run PO Road SB | | 1.46 | 1.42 | 1.29 | 1.49 | 1.45 | 1.21 | 1.43 |
| Bull Run PO Road NB | | 1.29 | 1.27 | 0.98 | 1.31 | 1.26 | 0.98 | 1.25 |
| VA 28 Bypass/Godwin Drive SB | | 0.90 | 0.90 | 0.86 | 0.89 | 0.89 | 0.86 | 0.88 |
| VA 28 Bypass/Godwin Drive NB | | 0.81 | 0.81 | 0.77 | 0.77 | 0.79 | 0.78 | 0.78 |
| US 29 EB | | 1.06 | 1.08 | 0.92 | 1.18 | 1.04 | 0.94 | 1.04 |
| US 29 WB | | 1.09 | 1.08 | 0.81 | 1.14 | 1.04 | 0.88 | 1.05 |
| VA 28 SB | | 1.23 | 1.21 | 1.22 | 1.20 | 1.19 | 1.18 | 1.22 |
| VA 28 NB | | 1.00 | 1.03 | 1.05 | 1.03 | 1.04 | 1.05 | 1.00 |
| Total | Freeway | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | Major Art | 0.89 | 0.89 | 0.86 | 0.90 | 0.88 | 0.86 | 0.88 |
| Total | Other Art | 0.82 | 0.80 | 0.68 | 0.83 | 0.80 | 0.66 | 0.79 |
| Total | Total | 0.88 | 0.88 | 0.85 | 0.89 | 0.87 | 0.85 | 0.87 |

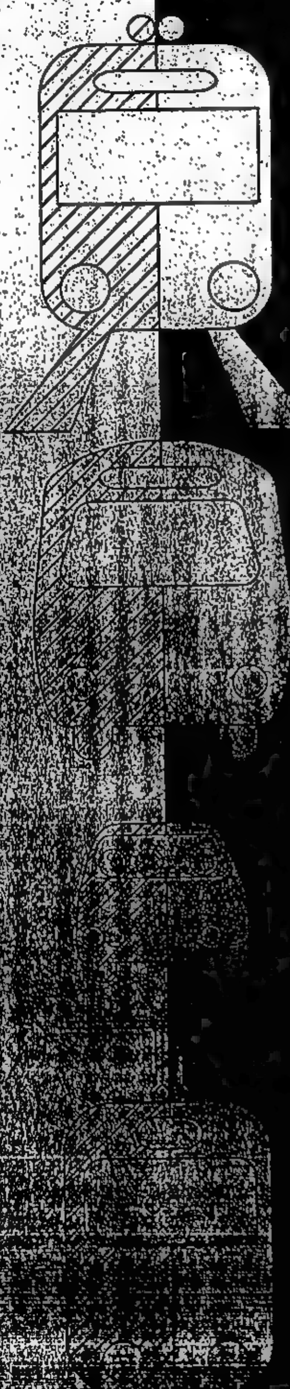
# Screen Line Summary - PM Peak Hour Volume/Capacity Ratio (2020)

Screen Line 11     I-66 South/East End

Location

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Stringfellow Road SB | 1.23 | 1.25 | 1.16 | 1.18 | 1.19 | 1.17 | 1.23 |
| Stringfellow Road NB | 0.91 | 0.92 | 0.89 | 0.91 | 0.90 | 0.87 | 0.95 |
| Fairfax County Parkway SB | 1.01 | 1.03 | 0.99 | 0.96 | 0.99 | 0.96 | 0.97 |
| Fairfax County Parkway NB | 0.86 | 0.84 | 0.80 | 0.77 | 0.85 | 0.84 | 0.83 |
| West Ox Road SB | 0.96 | 0.94 | 0.94 | 0.91 | 0.95 | 0.95 | 0.97 |
| West Ox Road NB | 0.85 | 0.83 | 0.83 | 0.80 | 0.82 | 0.80 | 0.85 |
| Monument Drive EB | 0.37 | 0.34 | 0.37 | 0.50 | 0.33 | 0.39 | 0.44 |
| Monument Drive WB | 0.21 | 0.15 | 0.20 | 0.41 | 0.16 | 0.16 | 0.17 |
| US 50 EB | 1.06 | 1.04 | 1.10 | 0.93 | 1.10 | 1.07 | 1.06 |
| US 50 WB | 1.12 | 1.14 | 1.10 | 1.10 | 1.10 | 1.10 | 1.12 |
| Waples Mill Road SB | 1.12 | 1.14 | 1.12 | 1.24 | 1.13 | 1.10 | 1.15 |
| Waples Mill Road NB | 1.23 | 1.24 | 1.26 | 1.23 | 1.22 | 1.21 | 1.25 |
| Jermantown SB | 1.19 | 1.22 | 1.17 | 1.37 | 1.23 | 1.22 | 1.21 |
| Jermantown NB | 1.17 | 1.25 | 1.21 | 1.37 | 1.22 | 1.24 | 1.24 |
| VA 123 SB | 0.91 | 0.95 | 0.92 | 1.13 | 0.92 | 0.98 | 0.98 |
| VA 123 NB | 0.85 | 0.89 | 0.89 | 1.07 | 0.94 | 0.94 | 0.93 |
| Blake Lane SB | 1.34 | 1.38 | 1.38 | 1.54 | 1.36 | 1.36 | 1.40 |
| Blake Lane NB | 1.50 | 1.50 | 1.51 | 1.75 | 1.50 | 1.50 | 1.52 |
| Nutley Street SB | 1.21 | 1.23 | 1.23 | 1.28 | 1.24 | 1.23 | 1.23 |
| Nutley Street NB | 1.39 | 1.40 | 1.42 | 1.49 | 1.40 | 1.37 | 1.39 |
| Cedar Lane SB | 1.09 | 1.11 | 1.10 | 1.11 | 1.08 | 1.08 | 1.10 |
| Cedar Lane NB | 1.16 | 1.20 | 1.21 | 1.23 | 1.19 | 1.17 | 1.20 |
| Gallows Road SB | 1.19 | 1.21 | 1.21 | 1.26 | 1.20 | 1.19 | 1.21 |
| Gallows Road NB | 1.20 | 1.21 | 1.22 | 1.23 | 1.20 | 1.20 | 1.20 |
| I-495 SB | 1.15 | 1.17 | 1.11 | 1.15 | 1.15 | 1.14 | 1.15 |
| I-495 HOV SB | 1.15 | 1.12 | 1.10 | 1.15 | 1.15 | 1.14 | 1.14 |
| I-495 HOV NB | 1.13 | 1.13 | 1.16 | 1.12 | 1.12 | 1.12 | 1.13 |
| I-495 NB | 1.15 | 1.16 | 1.17 | 1.13 | 1.14 | 1.15 | 1.15 |
| Total Freeway | 1.15 | 1.15 | 1.14 | 1.14 | 1.15 | 1.14 | 1.15 |
| Total Major Art | 0.98 | 0.99 | 0.98 | 1.00 | 1.00 | 0.99 | 0.99 |
| Total Other Art | 1.06 | 1.06 | 1.06 | 1.13 | 1.05 | 1.04 | 1.07 |
| Total Total | 1.05 | 1.06 | 1.05 | 1.09 | 1.06 | 1.05 | 1.06 |

# I-66 Major Investment Study



# Universe of Alternatives and First Screen Evaluation

DRAFT

DRAFT

# UNIVERSE OF ALTERNATIVES AND FIRST SCREEN EVALUATION

for the

## I-66 CORRIDOR MAJOR INVESTMENT STUDY

Prepared for the

Commonwealth of Virginia

Department of Rail and Public Transportation

and

Department of Transportation

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January 9, 1996

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# SUMMARY

The I-66 Major Investment Study (MIS) is being conducted to identify the most appropriate transportation investment strategy for the I-66 corridor between U.S. Route 15 in Prince William County, Virginia on the west and the Capital Beltway (I-495) in Fairfax County on the east. The I-66 MIS is being conducted to develop a regional consensus on a transportation investment strategy for the corridor that:

- Responds to the existing imbalance between existing transportation supply and demand;
- Supports anticipated growth and development in the corridor;
- Integrates the multi-modal transportation systems in the corridor;
- Provides input to other transportation facility and land use development decisions in the corridor; and,
- Provides input to the on-going regional transportation planning process.

This study is being conducted by the Virginia Department of Rail and Public Transportation (DRPT) and the Virginia Department of Transportation (VDOT) in response to a joint resolution of the Virginia General Assembly.

## ALTERNATIVE DEVELOPMENT PROCESS

Transportation alternatives for the I-66 corridor have been developed in response to existing and expected future corridor transportation problems. These alternatives are then evaluated relative to three general evaluation measures:

- Transportation service and mobility
- Area-wide and adjacency impacts
- Cost

The initial universe of alternatives is narrowed through a process of three screens or evaluations to arrive at the preferred transportation investment strategy. At each screen, more detailed evaluation criteria and measures of effectiveness are defined to further screen

alternatives. This report documents the initial universe of alternatives and the Screen 1 evaluation process.

## EVALUATION FRAMEWORK

The Screen 1 evaluation criteria are intended to identify environmental, operational and physical impacts which are so severe that implementation of a particular alternative ultimately would be precluded[1]. The Screen 1 evaluation focuses on three measures of effectiveness:

- Natural Environment/Community Context - A qualitative assessment of the impacts of each project alternative on water resources, rare, threatened or endangered species, parklands, historic resources and communities.

- Engineering Feasibility - An assessment of the physical feasibility to construct the alternative.

- Capital Cost - The order of magnitude capital cost to construct each alternative.

## UNIVERSE OF ALTERNATIVES

Thirteen alternative transportation improvement options have been identified and are evaluated as part of this report. Options for improvements involve a variety of transportation modes in the I-66 corridor including high occupancy vehicle (HOV) lanes, metro-like rail, light rail transit (LRT), commuter rail, and general highway improvements.

Public workshops conducted on November 14 and 15, 1995 yielded a number of suggestions for additional transportation alternatives to consider as part of the I-66 MIS process. These additional alternatives are currently being investigated and will be incorporated into the Screen 2 evaluation process as appropriate.

## SCREEN 1 EVALUATION

The results of the Screen 1 evaluation of alternatives is presented in the following table. The action to be taken on each alternative will be to either retain the alternative for further definition, analysis and evaluation or to eliminate the alternative from further consideration. The actions to be taken on each alternative will be identified following review of this report by the project Technical Advisory Committee (TAC).

---

1 Screening based on travel demand will be incorporated into the alternative evaluation process upon completion of the Dulles Travel Model.

TABLE S1
SUMMARY FIRST SCREEN EVALUATION OF ALTERNATIVES

| ALTERNATIVE | ENGINEERING FEASIBILITY | COMMUNITY IMPACTS | NATURAL ENVIRONMENT | CAPITAL COST 1995$ MILLIONS | ACTION |
|---|---|---|---|---|---|
| 1 - Base Case | Feasible | No Significant Impact | No Significant Impact | Included in CLRP | Retain for further analysis and evaluation |
| 2 - TDM/TSM/ ITS/Transit | Feasible | No Significant Impact | No Significant Impact | Minor relative to build alternatives | Retain for further analysis and evaluation |
| 3A - HOV Enhancement | Depends on construction of New Braddock/ Stone Road Connector | 0 Residential Structures<br>0 Commercial Structures | No Significant Impact | $25 | |
| 3B - HOV Extension Beyond Gainesville | No Significant Issues on I-66; ROW Issues on Rt 29 | 0 Residential Structures<br>0 Commercial Structures | No Significant Impact | $50 to 55 | |
| 3C - Barrier Separated HOV | Requires Substantial Reconstruction of I-66 including relocation of rest areas at Bull Run | 30+ Residential Structures<br>0 Commercial Structures | Potential Impacts on Parks (Section 4(f))<br>Stream Crossings (Section 404) | $525 | |
| 4A - I-66 Improvements | Requires major reconstruction of I-66 between Beltway and Rt. 50 | 30-40 Residential Structures<br>0 Commercial Structures | Potential Impacts on Parks (Section 4(f))<br>Stream Crossings (Section 404) | $225 | |
| 4B - Rt 29 and 50 Super Arterials | Requires upgrading Rt 29 between Centreville and Kamp Washington and Rt 50 between Fairfax Circle the Beltway. Major reconstruction of Rt 50 between I-66 and Fairfax Circle. | 30-40 Residential Structures<br>130+ Commercial Structures<br><br>Major disruption to Rt 50 through Fairfax City | Potential Impacts on Parks (Section 4(f))<br>Stream Crossings (Section 404) | $300 | |
| 4C - Maximum Road Improvement | Same as 4A and 4B | 70-80 Residential Structures<br>130+ Commercial Structures<br><br>Major disruption to Rt 50 through Fairfax City | Potential Impacts on Parks (Section 4(f))<br>Stream Crossings (Section 404) | $510 | |

| ALTERNATIVE | ENGINEERING FEASIBILITY | COMMUNITY IMPACTS | NATURAL ENVIRONMENT | CAPITAL COST 1995$ MILLIONS | ACTION |
|---|---|---|---|---|---|
| 5 - VRE to Gainesville/ Haymarket | Requires Manassas Rail Relocation Project | No major community impacts other than station sites (3-4 acres per station) | No Significant Impact | $30 | |
| 6A - Light Rail to Dulles | Generally Feasible; requires grade separations in/out of medians of I-66 and Rt 50 | 40-50 Residential Structures<br>15+ Commercial Structures<br>+property acquisition for station sites | Potential effects on historic districts and properties (Section 4(f) and Section 106)<br>Stream Crossings (Section 404) | Rail -$900<br>Road - $175<br>Total - $1,075 | |
| 6B - Light Rail to Centreville/ Manassas | Generally Feasible | 10 Residential Structures<br>145+ Commercial Structures<br>+property acquisition for station sites<br><br>Major disruption to Rt 50 through Fairfax City and Rt 28 between Centreville and Manassas Park | Potential effects on historic districts and properties (Section 4(f) and Section 106)<br>Stream Crossings (Section 404) | Rail -$630<br>Road -$425<br>Total - $1,055 | |
| 6C - Light Rail to Dulles and Centreville/ Manassas | Same as 6A and 6B | 50-60 Residential Structures<br>160+ Commercial Structures<br>+Property acquisition for station sites<br><br>Major disruption to Rt 50 through Fairfax City and Rt 28 between Centreville and Manassas Park | Potential effects on historic districts and properties (Section 4(f) and Section 106)<br>Stream Crossings (Section 404) | Rail -$1,500<br>Road -$600<br>Total - $2,100 | |
| 7A - Metro-like Rail to Centreville | Generally Feasible | 15-20 Residential Structures<br>0 Commercial Structures<br>+Property acquisition for terminal station site with major parking facilities | Stream Crossings (Section 404) | Rail -$360<br>Road - $150<br>Total - $510 | |
| 7B - Metro-like Rail to Dulles | Generally Feasible | 90-100 Residential Structures<br>15+ Commercial Structures<br>+Property acquisition for station sites | Potential effects on historic districts and properties (Section 4(f) and Section 106)<br>Stream Crossings (Section 404) | Rail -$960<br>Road - $230<br>Total - $1,190 | |

# 1.0 INTRODUCTION

## 1.1 STUDY BACKGROUND

The I-66 Corridor Major Investment Study (MIS) is being conducted to identify the most appropriate transportation investment strategy for the I-66 corridor between U.S. Route 15 in Prince William County, Virginia on the west and the Capital Beltway (I-495) in Fairfax County on the east. The project study area is shown in Figure 1.

The I-66 MIS is being conducted to develop a regional consensus on a transportation investment strategy for the corridor that:

- Responds to the existing imbalance between existing transportation supply and demand;
- Supports anticipated growth and development in the corridor;
- Integrates the multi-modal transportation systems in the corridor;
- Provides input to other transportation facility and land use development decisions in the corridor; and,
- Provides input to the on-going regional transportation planning process.

This study is being conducted by the Virginia Department of Rail and Public Transportation (DRPT) and the Virginia Department of Transportation (VDOT) in response to a joint resolution of the Virginia General Assembly. Technical direction during the course of the study is being provided by the project Technical Advisory Committee (TAC) which is composed of representatives of affected local, regional, state and federal units of government. Public input is being solicited through a series of public workshops, project newsletters and a toll free telephone number (1-800-811-4661).

## 1.2 ALTERNATIVE DEVELOPMENT PROCESS

The general planning process is illustrated in Figure 2. Alternatives for the I-66 corridor have been developed in response to existing and expected future corridor transportation problems. These alternatives are then evaluated relative to three general evaluation measures:

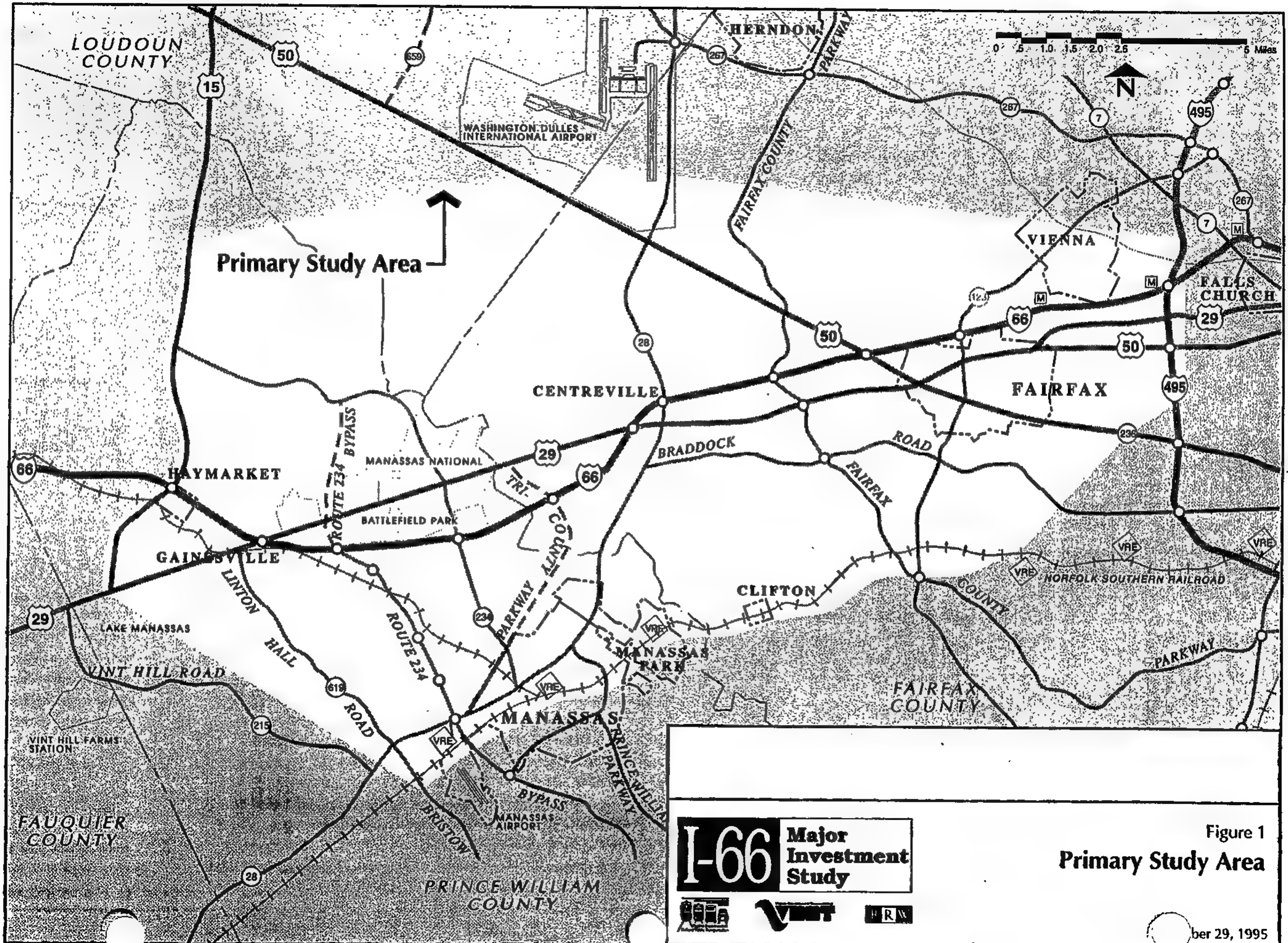
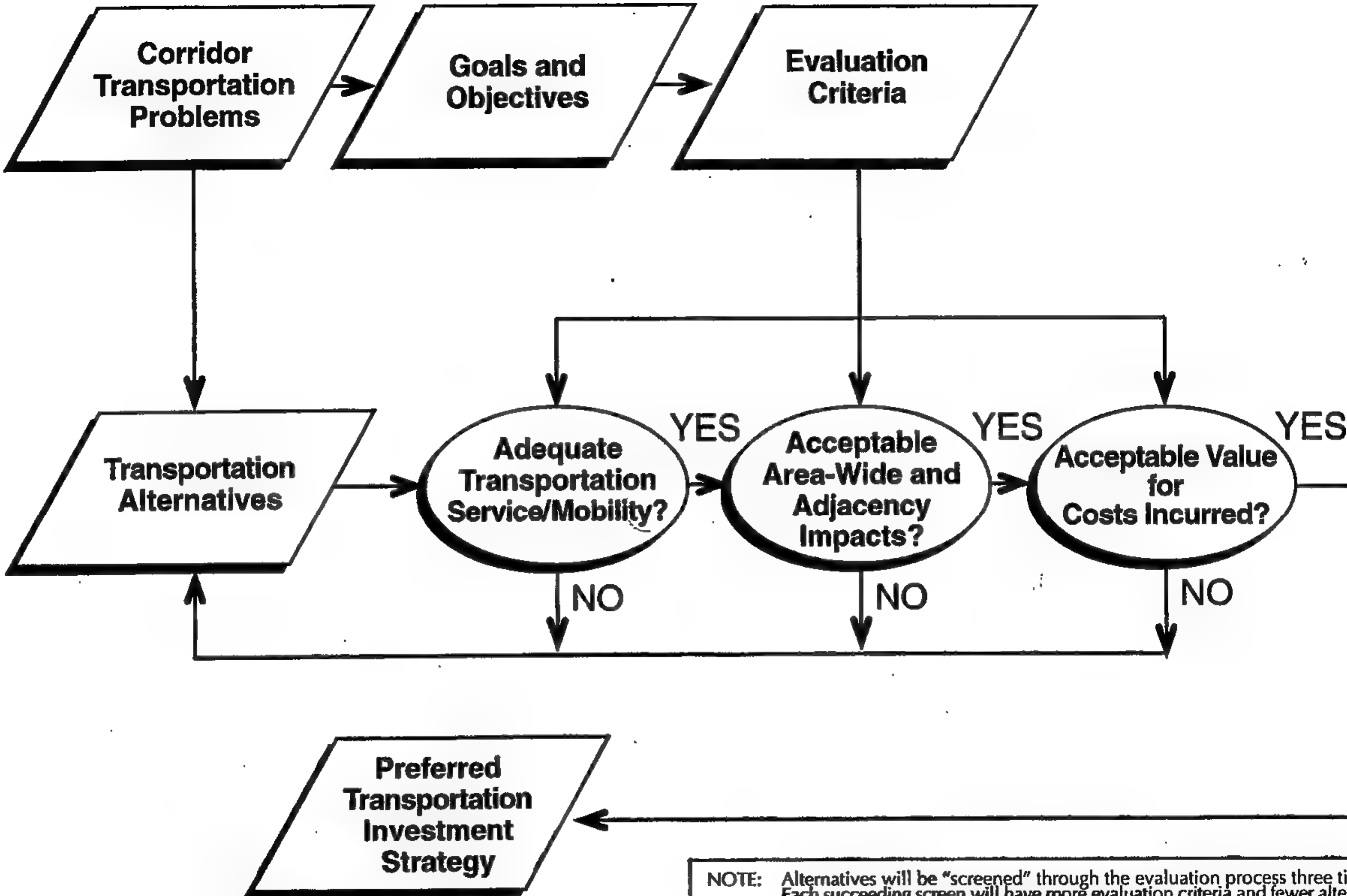



Figure 1
**Primary Study Area**

ber 29, 1995




NOTE: Alternatives will be "screened" through the evaluation process three times. Each succeeding screen will have more evaluation criteria and fewer alternatives.

I-66 Major Investment Study

Figure 2

**Overview of Planning Process**

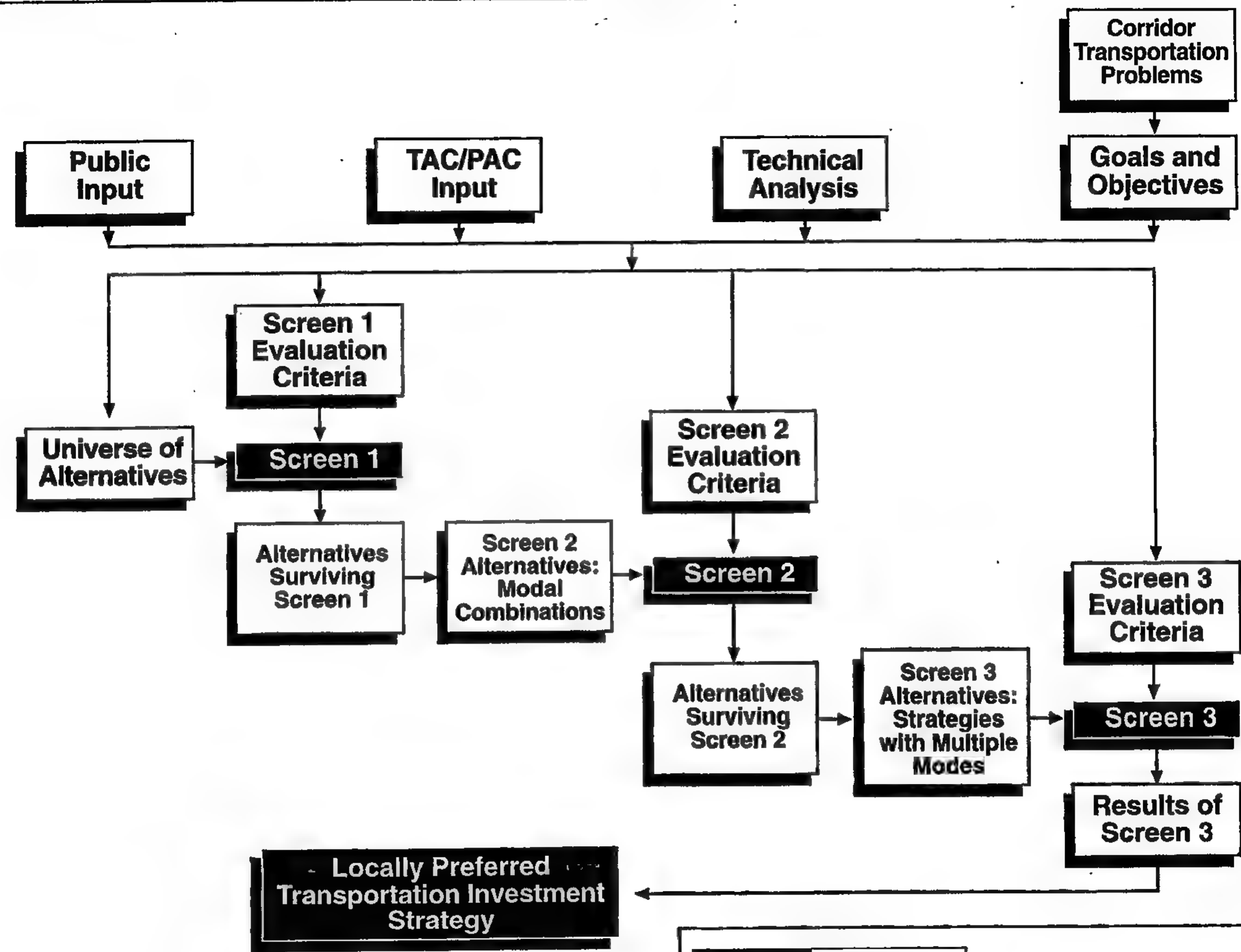
December 29, 1995

- Transportation service and mobility - The extent to which each alternative responds to existing transportation problems and mobility needs in the corridor.
- Area-wide and adjacency impacts - The social, economic and environmental (SEE) impacts of each alternative.
- Cost - The capital and operating and maintenance costs of the alternatives relative to available financial resources and the value of the alternative in terms of transportation service and mobility.

This general planning process has been refined as shown in Figure 3 to focus planning efforts on the most promising corridor transportation alternatives. As shown in this graphic, the initial universe of alternatives is narrowed through a process of three screens or evaluations to arrive at the preferred transportation investment strategy. At each stage in the planning process, the goals and objectives of the study along with input from the public and the Technical Advisory Committee are used to define more detailed evaluation criteria and measures of effectiveness to further screen alternatives.

The initial universe of alternatives consists of single-mode transportation options that are evaluated as part of Screen 1. The alternatives remaining after Screen 1 are refined and redefined to include combinations of transportation modes that are then evaluated as part of Screen 2. The alternatives remaining after Screen 2 are again refined and combined to form multi-modal alternatives that are evaluated as part of Screen 3. The result of Screen 3 is the basis for the preferred transportation investment strategy resulting from this process.

This report documents the initial universe of alternatives and the Screen 1 evaluation process.




I-66 Major Investment Study

Figure 3

**Alternatives Development Process**

December 29, 1995

# 2.0 EVALUATION FRAMEWORK

## 2.1 CORRIDOR TRANSPORTATION PROBLEMS

The transportation problems in the corridor were identified by the project Technical Advisory Committee and reinforced and confirmed by public input received at public workshops conducted on November 14 and November 15, 1995. The project transportation problems are shown in Table 1.

**TABLE 1**
**I-66 CORRIDOR TRANSPORTATION PROBLEMS**

| TRANSPORTATION SERVICE/MOBILITY |
|---|
| • Existing Vehicular Congestion in Both Peak Periods.<br>• Forecast of Worse Congestion and an Increase in Vehicle-Miles of Travel in the Year 2020.<br>• Insufficient Transit Accessibility to Employment Opportunities in Corridor.<br>• Lack of Management and Coordination of Truck Movement in the Corridor.<br>• Lack of Coordination and Management of the Multi-Modal Transportation System in the Corridor. |
| **ADJACENCY AND AREA-WIDE ENVIRONMENTAL IMPACTS** |
| • Inadequate Right-of-Way and Physical Limitations on Ability to Expand Corridor Infrastructure.<br>• Existing and Forecasted Dispersion of Population and Employment Throughout the Corridor and the Associated Travel Patterns.<br>• Concerns about Air Quality |
| **TRANSPORTATION INVESTMENT** |
| • Lack of Financial Resources to Pay for Needed Transportation Facilities and Services. |

## 2.2 GOALS AND OBJECTIVES OF THE STUDY

The goals and objectives of the study relate directly to the transportation problems in the corridor. The goals and objectives that have been defined for this study are shown in Table 2.

**TABLE 2**
**I-66 GOALS AND OBJECTIVES**

| TRANSPORTATION SERVICE/MOBILITY |
|---|
| • Accommodate Existing and Future Mobility Demands. |
| • Improve Regional Access to I-66 Corridor Activity Centers and Improve Access from the I-66 Corridor to the Region. |
| • Improve Goods Movement. |
| **ADJACENCY AND AREA-WIDE ENVIRONMENTAL IMPACTS** |
| • Coordinate the Transportation Improvements to Complement Existing and Future Land Uses. |
| • Minimize the Adverse Transportation Related Environmental Impacts and Foster Positive Environmental Impacts with Transportation Improvements. |
| **TRANSPORTATION INVESTMENT** |
| • Provide a Cost-Effective Investment Strategy for the I-66 Corridor. |

## 2.3 SCREEN 1 EVALUATION CRITERIA

The Screen 1 evaluation criteria are intended to identify environmental, operational and physical impacts which are so severe that implementation of a particular alternative ultimately would be precluded. The Screen 1 evaluation focuses on three measures of effectiveness:

- Natural Environment/Community Context
- Engineering Feasibility
- Capital Cost

These three measures are shown in the following table and discussed in more detail below[2].

---

2 Screening based on travel demand will be incorporated into the alternative evaluation process upon completion of the Dulles Travel Model.

SCREEN 1 MEASURES OF EFFECTIVENESS

| Goals | Evaluation Criteria | Measures of Effectiveness for Screen 1 |
|---|---|---|
| Provide Adequate Transportation Service/Mobility | Engineering Feasibility | Assessment of Physical Feasibility to Construct |
| Minimize Adjacency and Areawide Environmental Impacts | Natural Environment | Qualitative Assessment of Potential Impacts of Project On: • Water Resources • Rare, Threatened, Endangered Species |
| | Community Context | Qualitative Assessment of Potential Impacts of Project on: • Historic Resources • Parklands • Community Disruption |
| Make Sound Transportation Investments | Capital Cost | Order of magnitude capital cost relative to other alternatives |

## Natural Environment/Community Context

### *Purpose*

The primary purpose of the Screen 1 environmental analysis was to identify natural environment and community context issues in the I-66 Primary Study Area which would affect the development of alternative strategies for the corridor. The Screen 1 process focussed on identifying if each alternative had the potential to result in impacts to Social, Economic and Environmental (SEE) factors which were so severe that future implementation of the alternative ultimately would be precluded because of regulatory considerations, resource agency positions, local policies, public opinion, or sheer magnitude of impact. Another but equally important function of the Screen 1 environmental analysis was to ensure the early, integrated consideration of SEE factors into the planning process and decision-making, and to identify the regulatory and coordination requirements which would need to be addressed as corridor planning progresses.

### *Method and Criteria*

The Screen 1 environmental analysis was completed based upon published secondary data sources, supplemented by spot field reviews of key areas of potential impact. Sources consulted included U.S.G.S. Quadrangle Sheets, National Wetlands Inventory Maps, U.S.D.A. Soil Surveys, County Tax Maps, and local comprehensive plans.

Each alternative was assessed in terms of its ability to fit into the built environment, and its potential to impact the following broad SEE factor groups:

- *Natural Environment*
  - Water Resources and Aquatic Ecosystem
    (water quality, streams, wetlands, floodplains, special aquatic areas)
  - Rare, Threatened and Endangered Species

- *Community Context*
  - Historic Resources
    (structures, districts, archaeological resources)
  - Parklands
  - Community Disruption
    (property acquisition, displacements, noise, visual effects, local plans)

A qualitative, order of magnitude assessment of the potential impacts associated with each alternative was completed for each of the above SEE factor groups. The evaluation focussed on the possible effects of the various alternatives on those SEE factors which had the potential to be a discriminator among the conceptual alternatives under consideration. Each alternative was screened based on the following questions:

a. What is the potential to result in an impact to an identified SEE Factor?

Low Medium High

The potential to result in an impact was assessed in terms of the nature of the proposed improvement or activity and physical proximity to SEE factors identified in the corridor.

b. What is the character of the impact on the identified SEE Factor?

Indirect Direct Both

Indirect impacts refer to those which do not involve actual physical alteration of or encroachment on an identified resource. Examples of indirect impacts include introduction of new visual elements into the landscape, noise, and casting shadows or shading. Direct impacts are those which result from actual physical use of an identified resource or property. Examples of direct impacts include property acquisition, demolition of structures, and filling of wetlands.

c. What is the degree of impact on the identified SEE Factor?

Low Medium High

This measure is a qualitative order of magnitude assessment of the anticipated severity of the predicted impact, given the character of the SEE factor group affected. For example, a perpendicular crossing spanning a stream which is

already traversed by an existing right-of-way would be considered a low degree of impact in terms of water resources/aquatic ecosystem. A crossing which required relocation of an existing stream and filling of associated wetlands would be considered a high degree of impact. Passing through a neighborhood commercial district on an existing right-of-way might be considered a low degree of impact in terms of community disruption. Passing through a neighborhood commercial outside of existing rights-of-way and acquiring a number of businesses would be a high degree of impact.

d. What is the potential to avoid identified impacts during future project planning?

Low Medium High

Alternatives which were highly constrained in their physical location due to the character of the adjacent natural or built environment would have a low potential to avoid identified impacts.

e. What is the possibility of minimization/mitigation?

Low Medium High

Likelihood of minimization or mitigation of impacts was based upon the character and degree of impact anticipated, combined with the nature of the SEE resource affected. As part of this assessment, regulatory considerations such as Section 106 of the National Historic Preservation Act and Section 404 of the Clean Water Act were considered.

After screening each alternative based on the above questions, a recommendation as to whether the alternative should be eliminated from further consideration based on each SEE factor group was made. It is important to note that retention of an alternative at this stage does not mean that there are no environmental impacts expected to result from its implementation. The recommendation to retain or eliminate an alternative was based on an assessment as to whether the impacts identified to SEE factors were of such extraordinary magnitude that the alternative would not be viable.

## Engineering Feasibility

### *Purpose*

The purpose of Screen 1 engineering feasibility analysis was to identify engineering constraints that would preclude implementation of a particular alternative. This screen was designed to eliminate those alternatives that would be impractical to build because the magnitude of the engineering solution in terms of cost or physical impact would be substantial relative to other project alternatives.

*Method and Criteria*

The Screen 1 engineering feasibility analysis has been based on preliminary conceptual engineering of each project alternative, mapping available from secondary sources, and aerial photography (1993 and 1994). Typical cross-sections have been developed to estimate right-of-way requirements for each alternative. Design and operational constraints such as allowable grades, clearance requirements and transportation system interfaces associated with each travel mode have been considered. The typical cross-sections and design constraints were compared to existing physical conditions in the corridor. The relative degree of impact of each alternative was assessed and critical constraints or impacts that would preclude construction or operation of a specific alternative were identified.

## Capital Cost

*Purpose*

To assist in the comparison of alternatives, the construction costs have been estimated to identify alternatives which would have significantly higher capital costs and consequently would be less likely to be implemented than another alternative.

*Method and Criteria*

Order of magnitude capital costs were developed and compared under this effectiveness measure. Cost per mile estimates for construction of rail, HOV lanes and roadway improvements were used to compare the cost of individual alternatives. For this initial screen, property acquisition and right-of-way costs have not been included in the estimate. Unit costs were based on similar projects constructed in the region or nationally. For LRT unit costs, systems in Sacramento, Buffalo, Los Angeles, Santa Clara County, San Diego and Portland have been reviewed to develop unit cost estimates.

# 3.0 UNIVERSE OF ALTERNATIVES

## 3.1 ORIGINAL ALTERNATIVES

Fifteen transportation alternatives were identified at the start of the I-66 MIS. These original fifteen alternatives identified options for improvements involving a variety of transportation modes in the I-66 corridor including high occupancy vehicle (HOV) lanes, metro-like rail, light rail transit (LRT), commuter rail, and general highway improvements.

The original fifteen alternatives were reviewed with the project Technical Advisory Committee (TAC). The original fifteen alternatives included two alternatives that would have extended the Virginia Railway Express (VRE) commuter rail service from the existing terminus station at Manassas Airport southwest to the Nokesville area. As a result of the TAC review, the two alternatives including extension of VRE service to Nokesville were eliminated because it was felt that these alternatives did not terminate at a logical point. A logical terminus was felt to be in the area of Culpepper; this location was felt to be beyond the scope of the I-66 project.

Following is a description of the thirteen transportation alternatives that are evaluated as part of this first screen evaluation.

**Alternative No. 1 - Base Case (To Be Revised After Base Case Decision)**

**Problem Being Addressed:** This alternative defines the "base case" conditions of the study area transportation system in the forecast year of 2020 against which the performance or change associated with the other alternatives under consideration are to be measured.

**Defining Characteristics/Elements:** The Constrained Long Range Plan (CLRP) will generally serve as the Base Case. Table 3 documents the CLRP projects in the I-66 study area. The following improvements in the CLRP will not be included in the Base Case:

- I-495 (Virginia) HOV lanes
- I-66 HOV lanes between Route 15 and Gainesville (Route 29)

If an I-66 alternative involves a transportation improvement that is also included in the CLRP, the I-66 alternative will be analyzed. This alternative will be compared to the Base Case alternative which will include the CLRP improvement.

**TABLE 3**
**CLRP PROJECTS IN I-66 MIS STUDY AREA**

- • I-495, auxiliary lane northbound from US 50 to I-66
- ✗ I-495 HOV, from I-95/I-395 to Dulles Toll Road
- ✗ I-66, interchange improvements at SR 28
- ✗ I-66, two HOV, west of US 15 to Gainesville
- ✗ I-66, six lanes plus two HOV, Gainesville to Manassas
- ✗ I-66, six lanes plus two HOV, Manassas to US 50
- ✗ I-66, Stringfellow HOV access
- ✗ I-66, Monument Drive HOV access
- ✗ I-66, TMS improvements
- • US 15, US 29 to US 50, four lanes (three projects)
- • SR 28, Manassas Park, six lanes
- • SR 28, Fauquier County line to Manassas, four lanes (two projects)
- • SR 28 Bypass, from south of Manassas to I-66
- • SR 28, US 29 to I-66, six lanes
- • SR 28 and US 29, interchange
- • US 29/50, Draper to Eaton, six lanes
- ✗ US 29, Fairfax City to I-495, six lanes
- • US 50, Middleburg to VA 616, four lanes (three projects)
- ✗ US 50, I-66 to Fairfax City, eight lanes
- ✗ US 50, Fairfax City to Arlington, six lanes
- • SR 234, Manassas Bypass, six lane freeway (several projects)
- • Liberia Avenue, SR 28 to David Ford, four lanes
- • Richmond/Fairview, SR 234 to Liberia, four lanes
- • Braddock Road, Fairfax County Parkway to Union Mill, four lanes
- • Braddock Road, SR 123 to Fairfax County Parkway, six lanes
- • Stringfellow Road, US 29 to US 50, realign and widen to four lanes (multiple projects)
- • Fairfax County Parkway/Franconia - Springfield Parkway, six lanes, several segments
- • Centreville Road, Metrotech to McLearen, six lanes (multiple projects)
- • Lawyers Road extension, West Ox to Centreville Road, new four lanes (two projects)
- • Stonecroft Road, Westfields to US 50, four and six lanes (two projects)
- • Nutley Street, US 50 to US 29, four lanes
- • SR 606, US 50 to SR 28, four lanes (three projects)
- • Linton Hall Road, US 29 to SR 28, four lanes (two projects)
- • Bethlehem Road, SR 28 to Balls Ford Road, four lanes
- • Wellington Road, Manassas to SR 234 Bypass, four lanes (several projects)
- • Catharpin Road, SR 55 to SR 704, four lanes
- • Ashton Avenue, Balls Ford Road to Rixlew Lane, new four lanes (two projects)
- • Liberia Avenue, from Davis Ford to SR 234, new four lanes
- • Williamson Boulevard, from Sudley Manor to Portsmouth, new four lanes
- • Balls Ford Road, from SR 234 to SR 235 Bypass, four lanes
- • Clover Hill Road, from SR 234 Bypass to Manassas Airport, new four lanes
- • Sudley Manor Road, from SR 234 Bypass to Manassas Airport, new four lanes
- • East-West Connector, from Godwin Drive to Bethlehem Road, new four lanes
- • Gateway Drive, from Godwin Drive to Wakeman, new four lanes
- • Prince William Parkway, from Liberia to Minnieville, six lanes
- ✗ VRE, western Fairfax station
- ✗ VRE Burke Station parking expansion (200 space addition)
- ✗ VRE feeder bus services
- ✗ Stringfellow park-and-ride (500 spaces)

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✗ These projects relate directly to I-66 MIS alternatives under consideration.

## Alternative No. 2 - TDM/TSM/ITS/Transit Improvements

**Problem Being Addressed:** This alternative seeks to address the existing and projected year 2020 peak hour traffic congestion problems facing the study area through a coordinated series of TDM, TSM, ITS and transit service improvements.

**Defining Characteristics/Elements:** This alternative represents a continuation and expansion of currently ongoing and planned TDM (Travel Demand Management), TSM (Transportation System Management), ITS (Intelligent Transportation Systems) and transit service improvements within the study area. These would include, but not be limited to: expansion of long-term parking areas at the Vienna, Dunn Loring, and West Falls Church Metrorail stations; the provision of expanded parking at all VRE stations in the study area; the provision of expanded feeder bus service to all Metro and VRE stations in the study area; spot intersection improvements along both the arterial and collector street systems; signal preemption, pricing strategies, and initiation of other TDM actions at both existing and emerging major employment centers in the study area. Opportunities for implementing ITS elements to transit and highway modes, such as informational signs providing service status and roadway conditions.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case, more feeder bus services to Metro and VRE | Base Case, expand parking at Dunn Loring and Vienna stations | Increase service frequency |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case | Base Case, more feeder bus services to Metro and VRE | Base Case | Increase service frequency |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case, new and expanded transit/HOV parking areas | Base Case, more feeder bus services to Metro and VRE, expand TDM program in Fair Oaks, Fair Lakes, and Government Center areas | Base Case | Increase service frequency |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case, new and expanded transit/HOV parking areas | Base Case, more feeder bus service to Metro and VRE | Base Case | Increase service frequency |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case, new and expanded transit/HOV parking areas | Base Case, more feeder bus service to Metro and VRE, expand TDM programs in Manassas area | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case | Base Case | Base Case |

## Alternative No. 3A - I-66 HOV Facilities Enhancement

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion caused primarily by single occupant vehicles (SOVs) by providing greatly enhanced opportunities for use of the I-66 corridor by HOVs. Elements of the alternative also seek to alleviate traffic operational problems associated with HOV operations along I-66.

**Defining Characteristics/Elements:** This alternative represents an expansion of the currently ongoing and presently planned improvements to the HOV facilities in the I-66 corridor and seeks to increase the use of the HOV mode through a series of access and egress enhancements to the shared-use, inside median HOV lane similar to those currently under construction at Stringfellow Road and Monument Drive. Additional HOV entry/exit ramps would be provided at Stone Road Extended (to/from the east) and possibly Blake Lane (to/from the west) if neighborhood impacts can be avoided. The latter HOV ramp would provide direct access to the Vienna Metro station parking facilities. Dedicated/restricted HOV entry and exit ramps might also be investigated at other locations. These dedicated HOV ramps would connect the mainlines of these intersecting crossroads with the median area of I-66, allowing vehicles to enter the peak period HOV lanes at this point. Short segments of HOV only lanes could be provided along the intersecting crossroads as well. This option would not preclude future rail service in the I-66 median.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case and access to/from Vienna Metro station parking | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case, add HOV entry/exit ramps at Rt. 7100, Rt. 28, and Rt. 29 | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case, add HOV entry/exit ramps at Stone Road and perhaps at Rt. 234, Compton Road, and Rt. 234 Bypass | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case plus expanded bus service and park-ride | Base Case | Base Case |

## Alternative No. 3B - Extend HOV Lanes Beyond Gainesville

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion caused primarily by single occupant vehicles (SOVs) by providing enhanced opportunities for use of the I-66 corridor by HOVs.

**Defining Characteristics/Elements:** This alternative represents an expansion of the currently ongoing and presently planned improvements to the HOV facilities in the I-66 corridor and seeks to increase the use of the HOV mode through two primary actions: the extension of HOV lanes beyond Gainesville along the I-66 and/or U.S. Route 29 corridors, and a series of access and egress enhancements to the shared-use, median HOV lane similar to that currently under construction at Stringfellow Road. The dedicated/restricted HOV entry and exit ramps described in Alternative 3A - *I-66 HOV Facilities Enhancement* are incorporated within this alternative. Median, peak period, HOV lanes would be provided along I-66 from the Gainesville interchange to a logical terminus point west of the U.S. Route 15 interchange and along U.S. Route 29 from the Gainesville interchange to a logical terminus point south of the Route 15 / Route 29 intersection. It is noted that the extension of HOV lanes in the median area of U.S. Route 29 would likely require major reconstruction of much of this facility. This option would not preclude future rail service in the I-66 median.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case plus Alt. 3A elements | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case plus Alt. 3A elements | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case plus Alt. 3A elements | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case plus expanded bus service and park-ride | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case, extend HOV lanes along I-66 to Rt.15 and along Rt. 29 to a logical terminus point south of Rt. 15. | Base Case plus expanded bus service and park-ride | Base Case | Base Case |

**Alternative No. 3C - Create Barrier Separated HOV Facility Along I-66**

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion caused primarily by single occupant vehicles (SOVs) by providing enhanced opportunities for use of the I-66 corridor by HOVs and also addresses current day HOV traffic operational conflicts and lane violation problems.

**Defining Characteristics/Elements:** This alternative (Figure 4) would involve a major reconstruction effort along the I-66 mainline between the Capital Beltway and the Route 29 interchange in Gainesville. Between the Capital Beltway and the Vienna Metrorail Station, a new barrier separated HOV lane would be constructed on both sides of the existing median Metrorail line. The existing interchange of I-66 with the Capital Beltway would be reconfigured to create totally separate HOV and SOV ramp systems, in a manner similar to that being proposed for the I-95/ I-395/I-495 interchange in the Franconia/Springfield area of southeastern Fairfax County. Between the Vienna Metrorail Station and Gainesville, a barrier separated, limited access, 2-lane HOV facility would be provided in the median area of I-66. This facility would be similar in scale and concept to the existing HOV facility in the median of the I-95/I-395 corridor. The implementation of this option might preclude the future extension of Metro-like rail service west of the Vienna Station in the I-66 median dependent upon the selected roadway cross section design.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case, reconstruct I-66/ I-495 interchange | Base Case, create separated HOV lanes parallel to Metrorail line | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Base Case, reconstruct Rt. 123 and Rt. 50 interchanges | Base Case, create separated HOV lanes in I-66 median | Base Case | Base Case | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case, reconstruct Rt. 7100, Rt. 28, and Rt. 29 interchanges | Base Case, create separated HOV lanes in I-66 median | Base Case | Base Case | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case, reconstruct existing Rt. 234 interchange | Base Case, create separated HOV lanes in I-66 median | Base Case | Base Case | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case, reconstruct Rt. 234 Bypass and Rt. 29 interchanges | Base Case, create separated HOV lanes in I-66 median | Base Case | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case, extend median, peak period HOV lanes along I-66 to Rt.15 and along Rt. 29 to Rt. 15. | Base Case | Base Case | Base Case |

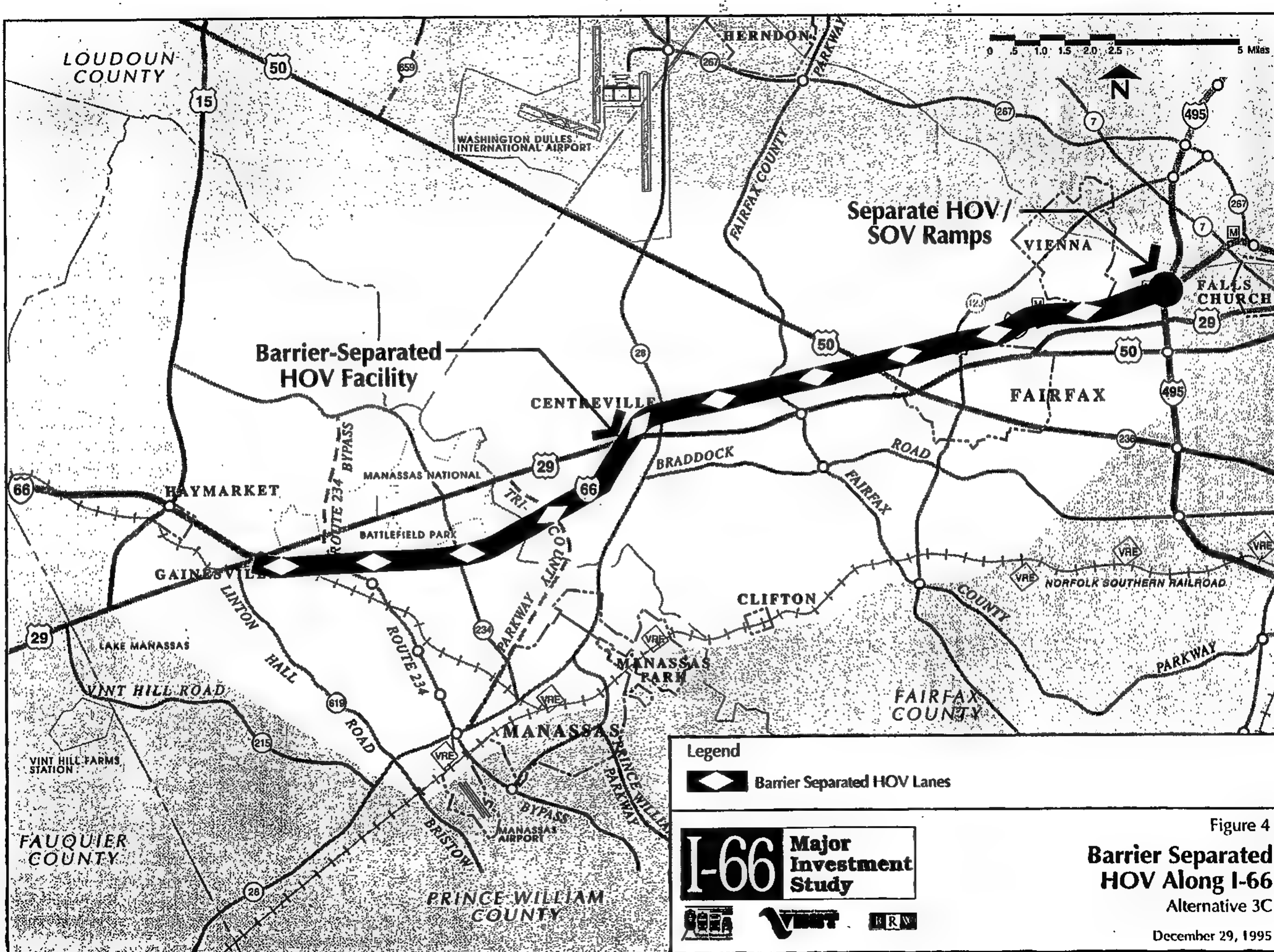



Figure 4

**Barrier Separated HOV Along I-66**

Alternative 3C

December 29, 1995

## Alternative No. 4A - I-66 Roadway Improvements

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion caused primarily by single occupant vehicles (SOVs) through the addition of both peak hour capacity for general traffic and enhancement of the median HOV lane. It would also alleviate some of the current HOV/non-HOV traffic operational conflicts associated with the lack of a physical separation between the lanes.

**Defining Characteristics/Elements:** This alternative would essentially reconstruct the entire I-66 mainline and its interchanges to current VDOT and AASHTO geometric standards from the Capital Beltway to Route 50. An additional general traffic lane would be added to the I-66 mainline in each direction, resulting in a total of four (4) general use travel lanes, and additional shoulder/buffer areas would be provided between the median side HOV lane and the general traffic lanes. Associated with this change to the I-66 mainline would be the reconstruction of the Capital Beltway, Nutley Street, Route 123 and Route 50 interchanges. In addition, many of the existing grade separations over I-66, such as at Blake Lane and Jermantown Road, would also have to be reconstructed. The implementation of this option would not preclude future rail service in the I-66 median.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Reconstruct I-66 mainline, add one SOV lane and improve HOV lane, reconstruct Capital Beltway, Nutley St. and Rt. 123 interchanges | Provide increased safety buffer between HOV and SOV lanes | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Reconstruct I-66 mainline, add one SOV lane and improve HOV lane, upgrade Rt. 50 interchange | Provide increased safety buffer between HOV and SOV lanes | Base Case | Base Case | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case | Base Case | Base Case | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case | Base Case | Base Case | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case | Base Case | Base Case |

## Alternative No. 4B - Upgrade Routes 29 and 50 to "Super Arterials"

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion in the corridor caused primarily by single occupant vehicles (SOVs) through the improvement of the existing arterial street system.

**Defining Characteristics/Elements:** This alternative would reconstruct major sections of U.S. Route 29 and U.S. Route 50 to what are termed "Super Arterials". Such facilities are wide, multi-lane arterials with limited access provided from intersecting streets. To the degree possible, major intersecting streets are grade separated in order to minimize the need for traffic signals. Under this concept, Route 29 would be improved to provide three (3) through lanes in each direction from Route 28 in Centreville to the City of Falls Church. Similarly, Route 50 would be improved to provide three (3) through lanes in each direction from Route 28 in Chantilly to the Capital Beltway in order to link up with other proposed CLRP improvements inside the Beltway. Grade separations would be provided where possible at major junctions such as Route 50/Route 29/Route 236 and Fairfax Circle. These improvements would be made within the existing rights of way to the maximum degree possible.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Widen Rt. 29 and Rt. 50 to 6-lane "Super Arterials" | Base Case | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Widen Rt. 29 and Rt. 50 to 6-lane "Super Arterials" | Base Case | Base Case | Base Case | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Widen Rt. 29 and Rt. 50 to 6-lane "Super Arterials" | Base Case | Base Case | Base Case | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case | Base Case | Base Case | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case | Base Case | Base Case |

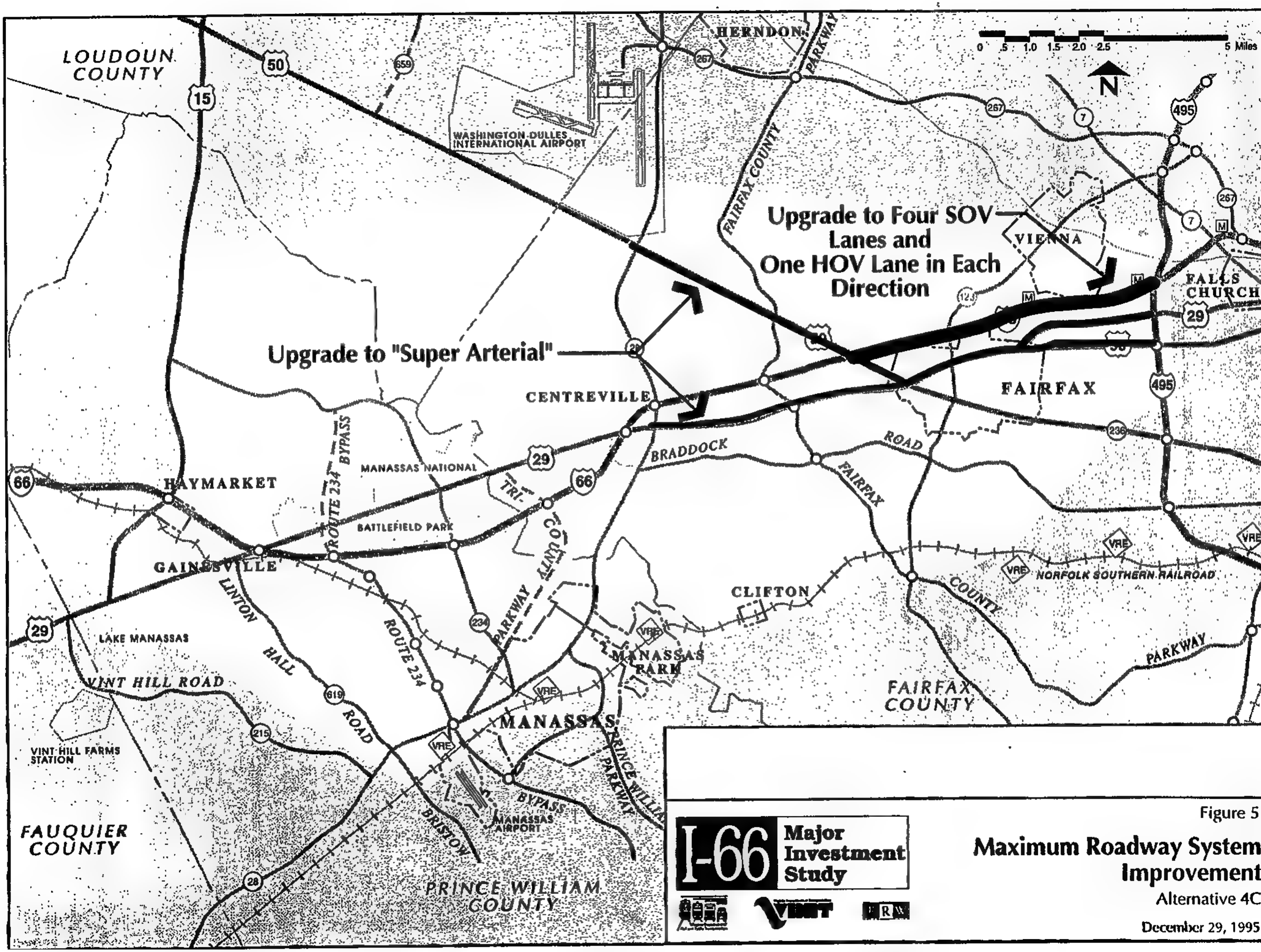
## Alternative No. 4C - Roadway System Improvements: I-66, Route 29, and Route 50

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion in the corridor caused primarily by single occupant vehicles (SOVs) through the improvement of both I-66 and the parallel arterial street system. The proposed improvements to I-66 would also help to alleviate many of the existing HOV/non-HOV traffic operational conflicts.

**Defining Characteristics/Elements:** This alternative (Figure 5) represents a combination of both Alternative 4A - *"I-66 Roadway Improvements"* and Alternative 4B - *"Upgrade Routes 29 and 50 to Super Arterials,"* and thus represents the maximum roadway system improvement option currently under consideration. This alternative would both reconstruct the I-66 mainline and its interchanges to current VDOT and AASHTO geometric standards from the Capital Beltway to Route 50, and reconstruct major sections of U.S. Route 29 and U.S. Route 50 to what are termed "Super Arterials." These improvements would be made within the existing rights of way to the degree possible.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Reconstruct I-66 mainline and interchanges; Widen Rt. 29 and Rt. 50 to 6-lane "Super Arterials" | Provide increased safety buffer between HOV and SOV lanes | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Rt. 50 | Reconstruct I-66 mainline and interchanges; Widen Rt. 29 and Rt. 50 to 6-lane "Super Arterials" | Provide increased safety buffer between HOV and SOV lanes | Base Case | Base Case | Base Case |
| 3 - Rt. 50 to Fairfax County Parkway | | | | | |
| 4 - Fairfax County Parkway to Rt. 28 | Widen Rt. 29 and Rt. 50 to 6-lane "Super Arterials" | Base Case | Base Case | Base Case | Base Case |
| 5 - Rt. 28 to VA Rt. 234 | Base Case | Base Case | Base Case | Base Case | Base Case |
| 6 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case | Base Case | Base Case |
| 7 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case | Base Case | Base Case |




I-66 Major Investment Study

Figure 5

**Maximum Roadway System Improvement**

Alternative 4C

December 29, 1995

## Alternative No. 5 - Extend VRE Service to Gainesville and Haymarket

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion in both the I-66 and U.S. Route 29 corridors caused primarily by single occupant vehicles (SOVs) by providing a branch operation off of the existing VRE service.

**Defining Characteristics/Elements:** This alternative would create a branch off of the existing VRE Manassas Line service to serve the communities of Gainesville and Haymarket. This operation would most likely be provided through a branch operation beginning at the Downtown Manassas VRE station and using the existing Norfolk Southern branch line tracks running generally parallel to Wellington Route (Route 674). This would most likely require the implementation of the Manassas Rail Relocation Project. A proposed station in the Gainesville area would serve commuters in the U.S. Route 29 corridor, while a station in the Haymarket area would service commuters in the I-66 corridor from the west. In addition to this service extension, reverse peak VRE operations could be provided on an hourly frequency and midday operations also be provided on a 60 minute frequency. *Inasmuch as Norfolk Southern owns the railroad right of way over which this alternative would operate, Norfolk Southern would have to agree in order for this alternative to be realized. It is deemed unlikely that Norfolk Southern would agree to any commuter rail service on its Manassas - Gainesville - Haymarket line without the Manassas Rail Relocation Project (the proposed railroad realignment sponsored by VDOT and VDRPT which is currently under study). (Subject to revision by Prince William County.)*

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case | Base Case | Base Case, provide reverse peak and midday service |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case | Base Case | Base Case | Base Case, provide reverse peak and midday service |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case | Base Case | Base Case | Base Case, provide reverse peak and midday service |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case | Base Case | Base Case | Base Case, provide reverse peak and midday service |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case | Base Case | Extend VRE service to Gainesville and Haymarket |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case | Base Case | Extend VRE service to Gainesville and Haymarket |

### Alternative No. 6A - Light Rail Transit to Dulles International Airport (IAD)

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion in the I-66 and U.S. Route 50 corridors caused primarily by single occupant vehicles (SOVs) by providing a major fixed guideway transit investment in the I-66 and Route 50 corridors.

**Defining Characteristics/Elements:** This alternative would introduce a new transit mode into the study area: light rail transit service. In this alternative, the Vienna Metrorail Station would be modified to allow a transfer between light rail transit and Metrorail service. West of the Vienna station, light rail transit service would be operated in the median of I-66 to the Route 50 interchange area, where the light rail transit tracks would leave the I-66 median to pass through the Fair Oaks / Fair Lakes area, and then proceed to Route 50 in the vicinity of the Fairfax County Parkway. From this point west, the light rail transit line would parallel Route 50 to Route 28 in the Chantilly area, with a possible station at the proposed Dulles Airport Annex of the Smithsonian Institution's National Air and Space Museum, and a terminus station at IAD main terminal. Stations would be provided at approximately 1-2 mile spacings along the I-66 median and at approximately ½ mile to 1-mile spacing along the Route 50 corridor. The implementation of this alternative would likely preclude the future extension of Metro-like rail service in the I-66 median west of the Vienna Station.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new light rail transit stations | Construct light rail transit line in I-66 median from Vienna Metro station to Rt. 50 interchange | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new light rail transit stations | Construct light rail transit line through Fair Oaks / Fair Lakes area and along Rt. 50 to Rt. 28 | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case | Base Case | Base Case | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case | Base Case | Base Case |

## Alternative No. 6B - Light Rail Transit to Centreville / Manassas

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion in the I-66 and U.S. Route 50 corridors caused primarily by single occupant vehicles (SOVs) by providing a major fixed guideway transit investment in the I-66, Route 28, and Route 29 corridors.

**Defining Characteristics/Elements:** This alternative would introduce a new transit mode into the study area: light rail transit service. In this alternative, the Vienna Metrorail Station would be modified to allow a transfer between light rail transit and Metrorail service. The proposed light rail transit service would leave the Vienna Station and generally follow the alignment of Lee Highway (Route 29/50) through the Fairfax Circle, Kamp Washington, Fairfax County Government Center, and Centreville areas to Route 28. From this point, the light rail transit route would turn south and generally follow Route 28 into the City of Manassas, with a terminus station likely to be located somewhere in the vicinity of Downtown Manassas. Stations would be provided at approximately a ½ mile to 1-mile spacing along the Route 29 and Route 28 corridors. Station access (e.g., pedestrian, feeder bus, etc.) is critical to the success of LRT service. The implementation of this alternative would not preclude the future extension of Metro-like rail service in the I-66 median west of the Vienna Station.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new light rail transit stations | Construct light rail transit line along Lee Highway (Rt. 29) from Vienna Metrorail station to Rt. 50 | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new light rail transit stations | Construct light rail transit line along Lee Highway (Rt. 29) through Fairfax Co. Govt. Center and Centreville areas to Rt. 28 | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new light rail transit stations | Construct light rail transit line along Rt. 28 to Downtown Manassas | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case | Base Case | Base Case |

## Alternative No. 6C - Light Rail Transit to Both IAD Area and Centreville / Manassas

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion in the I-66 and U.S. Route 50 corridors caused primarily by single occupant vehicles (SOVs) by providing a major fixed guideway transit investment in the I-66, Route 29, Route 28, and Route 50 corridors.

**Defining Characteristics/Elements:** This alternative (Figure 6) represents a combination of Alternative 6A - *Light Rail Transit to Chantilly / Route 28 Area* and Alternative 6B - *Light Rail Transit to Centreville / Manassas*, and thus represents the maximum light rail transit option currently under consideration. The Vienna Metrorail Station would be modified to allow for both Metro and light rail transit operations. The proposed light rail transit service would leave the Vienna Station and generally follow the alignment of Lee Highway (Route 29/50) through the Fairfax Circle and Kamp Washington areas of Fairfax County. At this point, the light rail transit line would split, with one branch following Route 50 west through the Fair Oaks / Fair Lakes, Greenbrier and Chantilly areas to Route 28 in the Chantilly area, and continuing to IAD. The other light rail transit line would follow Route 29 west through the Fairfax County Government Center and Centreville areas to Route 28. From this point, the Route 29 light rail transit line would turn south and generally follow Route 28 into the City of Manassas, with a terminus station in the vicinity of Downtown Manassas. Stations would be provided along both lines at approximately a ½ mile to 1-mile spacing. The implementation of this alternative would not preclude the future extension of Metro-like rail service in the I-66 median west of the Vienna Station.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new light rail transit stations | Construct light rail transit line along Lee Highway (Rt. 29) from Vienna Metrorail station to Rt. 50 at Kamp Washington | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new light rail transit stations | Construct two branching light rail transit lines, one along Lee Highway (Rt. 29) through the Fairfax Co. Govt. Center and Centreville areas to Rt. 28 and one along Rt. 50 through the Fair Oaks/Fair Lakes areas to Rt. 28 at Chantilly | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new light rail transit stations | Construct light rail transit line along Rt. 28 to Downtown Manassas | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case | Base Case | Base Case |

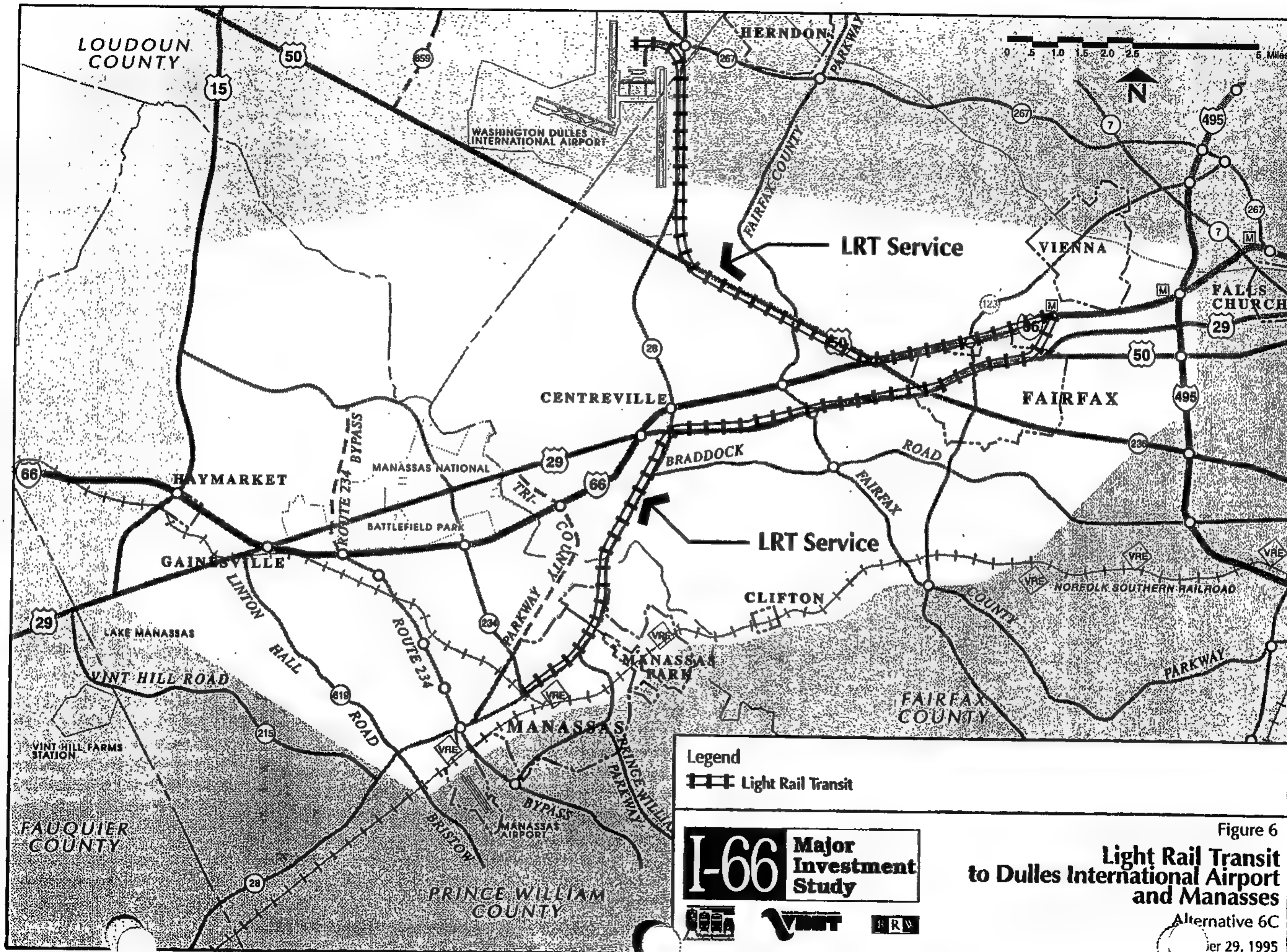



Figure 6

**Light Rail Transit to Dulles International Airport and Manasses**

Alternative 6C

...er 29, 1995

## Alternative No. 7A - Metro-like Rail Extension to Centreville (All in I-66 Median)

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion caused primarily by single occupant vehicles (SOVs) by providing a major fixed guideway transit investment in the I-66 corridor.

**Defining Characteristics/Elements:** This alternative would extend the existing Metrorail Orange Line service from its current terminus station at Vienna to a new terminus station in the vicinity of the I-66/U.S. Route 29 interchange in the Centreville Area. This alternative represents the detailed quantification of a concept originally identified in the Fairfax County Comprehensive Plan. The Metro-like rail line extension would be provided entirely within the median area of I-66. It is anticipated that two to three new Metro-like rail stations would be provided: an intermediate station to serve the Fair Oaks/Fair Lakes/Fairfax County Government Center area, a terminus station in the Centreville area (Stringfellow Road), and possibly a station in the vicinity of Jermantown Road. These stations would provide short-term and long-term parking facilities and bus access/egress areas similar to those at the existing Dunn Loring and Vienna Stations.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Extend Metrorail line, new station in Fair Oaks/ Fair Lakes/Government Center area | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Extend Metrorail line, new station in the Centreville area | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Base Case | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Base Case | Base Case |

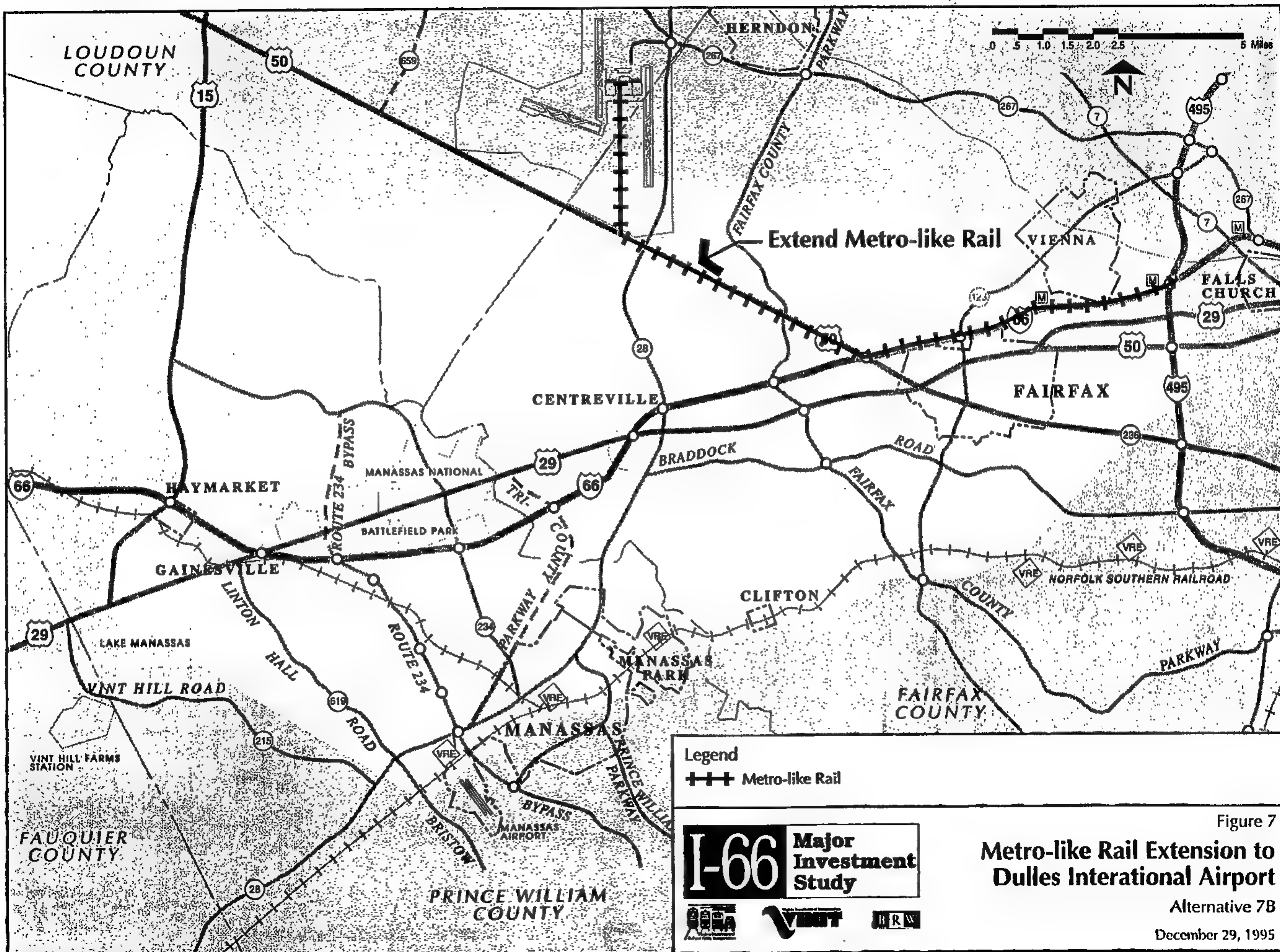
## Alternative No. 7B - Metro-like Rail Extension to Dulles International Airport (IAD) via Route 50

**Problem Being Addressed:** This alternative seeks to reduce present and projected year 2020 peak hour traffic congestion caused primarily by single occupant vehicles (SOVs) by providing a major fixed guideway transit investment in the I-66 and U.S. Route 50 corridors.

**Defining Characteristics/Elements:** This alternative (Figure 7) would extend the existing Metrorail Orange Line service from its current terminus station at Vienna to a new terminus station in the vicinity of the U.S. Route 50/Route 28 interchange in the Chantilly area of Fairfax County. The Metro-like rail line extension would be provided within the median area of I-66 between the existing Vienna station and the I-66/Route 50 interchange. It would then leave the I-66 median and generally follow the alignment of Route 50 as either a median aerial or median at-grade facility to the Route 28 interchange area. It is anticipated that three or four new Metro-like rail stations would be provided: intermediate stations to serve the Fair Oaks/Fair Lakes/Fairfax County Government Center, Greenbrier, and Chantilly areas, a station to serve the proposed Air and Space Museum Annex at IAD, and a terminus station at IAD. All of these proposed stations would provide short-term and long-term parking facilities and bus access/egress areas similar to those at the existing Dunn Loring and Vienna Stations. Reconstruction of the section of Route 50 from I-66 to Route 28 would be required.

**Summary Characteristics of Alternative:**

| *Corridor Segment* | *General Use Highway Lanes* | *HOV Lanes and Facilities* | *TDM/TSM/ITS Bus Transit Services* | *Metro-like Rail / Light Rail Transit Services* | *VRE Services* |
|---|---|---|---|---|---|
| 1 - Beltway to Vienna Metrorail | Base Case | Base Case | Base Case | Base Case | Base Case |
| 2 - Vienna Metro to U.S. Route 50 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Extend Metrorail line in I-66 median, new station in Fair Oaks/ Fair Lakes/Govt. Center area | Base Case |
| 3 - U.S. Rt. 50 to Centreville | Base Case, reconstruct Rt. 50 from I-66 to Rt. 28 as required | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Extend Metrorail line along Rt. 50 to Route 28 at Chantilly, new stations in the Green-brier, Chantilly, and Dulles Airport areas | Base Case |
| 4 - Centreville to VA Rt. 234 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Base Case | Base Case |
| 5 - VA Rt. 234 to Gainesville | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Base Case | Base Case |
| 6 - Gainesville to U.S. Rt. 15 | Base Case | Base Case | Base Case, modify bus routes as needed for feeder service to new Metro-like rail stations | Base Case | Base Case |




I-66 Major Investment Study

Figure 7

**Metro-like Rail Extension to Dulles Interational Airport**

Alternative 7B

December 29, 1995

## 3.2 ALTERNATIVES FROM PUBLIC WORKSHOPS

Public workshops conducted on November 14 and 15, 1995 yielded a number of suggestions for additional transportation alternatives to consider as part of the I-66 MIS process. These additional alternatives are described in Table 4. The project TAC is in the process of considering these additional alternatives for inclusion in the I-66 MIS. Those alternatives that the TAC considers to be appropriate for inclusion will be incorporated into the Screen 2 evaluation process.

**TABLE 4**
**ALTERNATIVES SUGGESTED AT NOVEMBER 1995 PUBLIC HEARING**

| ALT. SUGGESTED | DESCRIPTION |
|---|---|
| 1. North-South Light Rail | Light rail would be constructed in or adjacent to the Route 28 corridor from Dulles to Manassas Park in response to concerns regarding north-south mobility and existing traffic congestion. |
| 2. Reversible General Purpose Express Lanes in Median | Express lanes operating one-way eastbound in the morning and one-way westbound in the afternoon would be constructed in the median of I-66. The express lanes would displace the existing HOV lanes. |
| 3. Toll Road | Tolls could be implemented with a number of roadway options. Tolls could be charged on all of I-66 or incorporated into an express lane alternative. Tolls could be used to sell excess capacity in a barrier separated HOV alternative. |
| 4. Eliminate HOV Lanes | Existing HOV lanes would be converted to general purpose travel lanes. |
| 5. North-South HOV Lanes | HOV lanes would be constructed in or adjacent to the Route 28 corridor from Dulles to Manassas Park and/or in the Route 50 corridor in response to concerns regarding north-south mobility and existing traffic congestion |
| 6. Air Service | Some type of commuter air service would be established to shuttle people through the corridor. |
| 7. High Speed Telecommunications | High speed telecommunications facilities would be established in the I-66 corridor to enhance the potential for telecommuting. |
| 8. Develop a Monorail System | A monorail system similar to Disney World would be established. |
| 9. Bicycle Facilities | Bicycle facilities would be improved to provide improved bicycle access across I-66, bicycle facilities parallel to I-66 and improved bicycle access and storage facilities at transit stations. |
| 10. Moveable Barriers | Moveable barriers would be used to designate one or more lanes for use by the peak direction of travel. The lane(s) would operate eastbound in the morning and westbound in the afternoon. |

# 4.0 SCREEN 1 EVALUATION

The first screen evaluation of alternatives considered each of the thirteen original alternatives defined in Section 3.1. The first step in the screening process was to refine the definition of the alternative. This was done through field reviews and based on available mapping. The refined alternatives were then subject to the screening evaluation described in Section 2.3. Following is a discussion of each alternative documenting the refinements to the alternative, potential impacts to the natural environment and community context, engineering feasibility, capital cost and preliminary findings.

## 4.1 BASE CASE - ALTERNATIVE 1 (To be revised after Base Case Decision)

### Definition

This alternative defines the base case conditions of the study area transportation system in the forecast year 2020 against which the performance or change associated with the other alternatives under consideration are to be measured. For purposes of this analysis, the base case alternative is defined to consist of the existing transportation system plus those transportation system improvements identified in the Constrained Long Range Plan (CLRP) with the following exceptions:

- I-495 (Virginia) HOV lanes
- I-66 HOV lanes between Route 15 and Gainesville (Route 29)

### Screening/Evaluation

- **Natural Environment and Community Context**

  Based upon the current level of information available, combined with the preliminary findings of corridor reconnaissance, no factors related to the community context or natural environment have been noted which preclude future consideration of this alternative.

- **Engineering Feasibility**

  It is assumed that projects included in the base case alternative are feasible to construct.

- Cost

  Projects in the base case alternative are all part of the Constrained Long Range Plan(CLRP). The CLRP is financially constrained and therefore, it is assumed that all projects in the base case can be funded.

## Findings

The base case alternative will be retained for further refined definition, analysis and evaluation.

# 4.2 TDM/TSM/ITS/TRANSIT IMPROVEMENTS - ALTERNATIVE 2

## Definition

Travel Demand Management (TDM) refers to actions taken to reduce the number of vehicles using the road system by providing a variety of alternative transportation options. TDM can include employer implemented measures such as flextime, preferential car pool parking, telecommuting, and subsidized transit passes. TDM can also include regional measures such as park and ride lots, improved transit service, bike paths and bicycle storage facilities and travel information programs.

Transportation System Management (TSM) refers to generally low-cost measures designed to maximize the existing investment in the transportation infrastructure. TSM improvements could include expansion of long-term parking at the Vienna and Dunn Loring Metrorail stations, expansion of parking at VRE stations in the study area, expanded feeder bus service to all Metro and VRE stations, and spot intersection improvements along both the arterial and collector street systems.

Intelligent Transportation Systems (ITS) refers to a variety of communications systems designed to improve the quality and timeliness of transportation information available to transportation system users. ITS technologies to be investigated will include changeable message signs (CMS), highway advisory radio (HAR), real-time transit information systems, and improved transportation system monitoring capabilities.

This alternative will also include consideration of other transit system improvements including increased frequencies, increased hours of service, expanded routing, and express bus routes.

## Screening/Evaluation

- **Natural Environment and Community Context**

  Table 5 summarizes the results of the environmental screening conducted for Alternative 2. Overall, this alternative has a low potential to effect SEE factors. Impacts to SEE factors, if any, are most likely to be indirect in character, such as minor changes in noise levels or introduction of new visual elements (e.g. park-and-ride lots, traffic control devices, signage) into the landscape. It is unlikely these impacts would be substantial, given the limited scale of physical improvements associated with this alternative, and that most activities would occur in existing rights-of-way. Based upon the current level of information available, combined with the preliminary findings of corridor reconnaissance, no factors related to the community context or natural environment have been noted which preclude future consideration of this alternative.

- **Engineering Feasibility**

  All actions to be implemented as part of this alternative are expected to be feasible.

- **Cost**

  The cost of this alternative is expected to be small relative to any of the build alternatives.

## Findings

The TDM/TSM/ITS/Transit alternative will be retained for further refined definition, analysis and evaluation.

# 4.3 HIGH OCCUPANCY VEHICLE LANES (HOV) - ALTERNATIVE 3

## Definition

HOV lanes currently exist or are under construction in the study area from the beltway (I-495) to Gainesville (Route 29). The alternatives under consideration would either expand the existing HOV system, improve access to the HOV lanes, or reconstruct the HOV lanes to improve operations. These alternatives are proposed to alleviate traffic operational problems associated with the existing HOV lanes and to encourage additional HOV use. Two types of HOV facilities are under consideration. The existing HOV lane on I-66 are known as concurrent or continuous access HOV lanes. They exist adjacent to the general purpose travel lanes separated by a double paint stripe. The second type of HOV facility are limited access, barrier separated HOV lanes. This type of facility currently exists in the median of the I-95/I-395 corridor.

TABLE 5

## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 2 - TDM/TSM/ITS/Transit Improvements

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | Low | X | | | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | Low | | | X | Low | High | High | No |
| ● Parklands | Low | X | | | Low | High | High | No |
| ● Community Disruption | Low | X | | | Low | High | High | No |

Source: BRW, Inc.

## Refinement of Alternatives

*Alternative No. 3A - I-66 HOV Facility Enhancement*

Under this alternative, access to the existing I-66 HOV lanes would be improved by adding inside HOV access/egress ramps similar to those currently under construction at Stringfellow Road. Additional HOV entry/exit ramps would be provided at Stone Road extended (to/from the east) and Blake Road (to/from the west) as shown on Figure 8. The Blake Lane access would be intended to serve the Vienna Metro station and could provide direct access to Metro parking facilities.

*Alternative No. 3B - Extend HOV Lanes Beyond Gainesville*

This alternative includes the HOV access improvements described under Alternative 3A. In addition, the existing I-66 HOV lanes would be extended along I-66 from the Route 29 interchange in Gainesville to west of the Route 15 interchange as shown on Figure 9. These I-66 HOV lanes would be provided adjacent to the median and would operate during peak hours consistent with the existing I-66 HOV lanes. HOV lanes would also be constructed along U.S. 29 from I-66 in Gainesville to west of the intersection with Route 15. HOV lanes in the median of Route 29 would require extensive reconstruction of this facility.

*Alternative No. 3C - Create Barrier Separated HOV Facility along I-66*

This alternative would involve major reconstruction of I-66 between the Beltway (I-495) and the Route 29 interchange in Gainesville. Between the Beltway and the Vienna Metro station, a new barrier separated HOV lane would be constructed along one side of the existing median Metro line. The existing interchange of I-66 with the Beltway would be reconfigured to create totally separate HOV and SOV ramp systems. Between the Vienna Metro station and Gainesville, a barrier separated, limited access 2-lane HOV facility would be provided in the median area of I-66. Exclusive HOV interchanges would be provided at Blake Lane, Monument Drive, Stringfellow Road and Stone Road. Slip ramps in and out of the HOV facility would be provided at approximately five locations along I-66 between Route 29 and Route 123.

## Screening/Evaluation

- **Natural Environment and Community Context**

  Alternative No. 3A - I-66 HOV Facility Enhancement:

  Table 6 summarizes the results of the environmental screening conducted for Alternative 3A. Overall, this alternative has a low potential to effect SEE factors. Impacts are most likely to be indirect in character, such as a change in noise levels or introduction of new visual elements into the landscape. Impacts would be confined largely within existing rights-of-way, thereby limiting physical potential

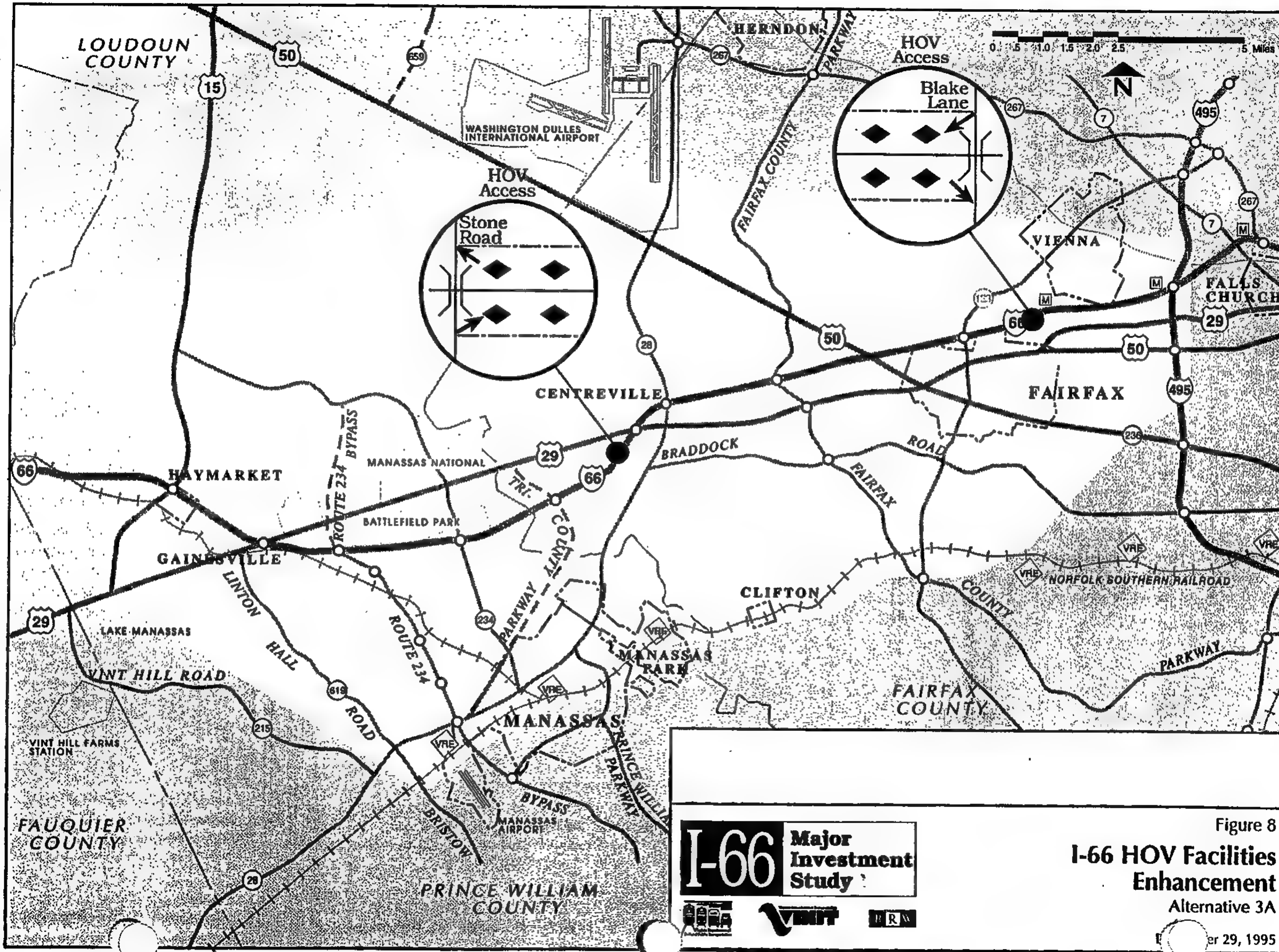



Figure 8

**I-66 HOV Facilities Enhancement**

Alternative 3A

...er 29, 1995

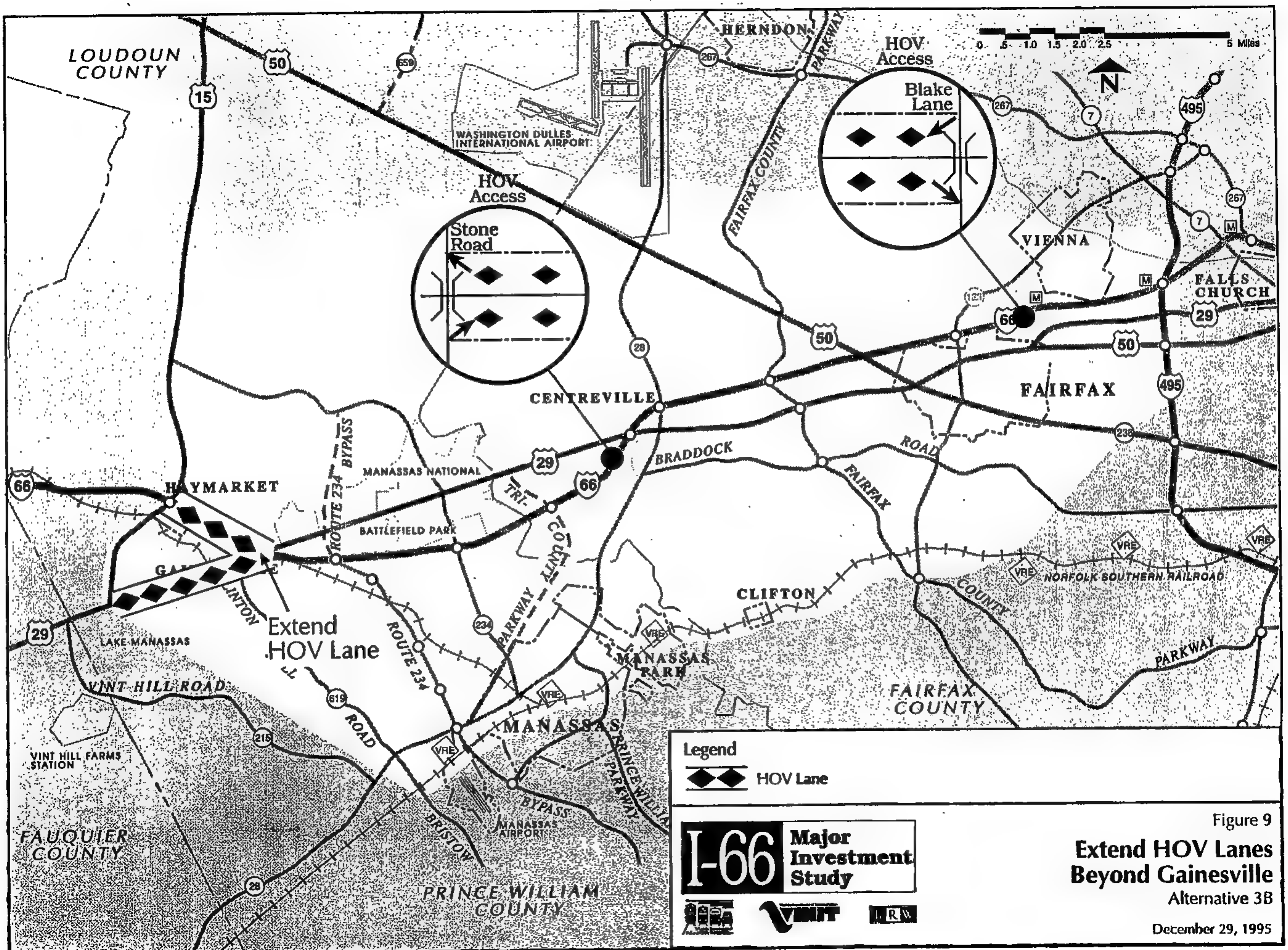



Figure 9

**Extend HOV Lanes Beyond Gainesville**

Alternative 3B

December 29, 1995

TABLE 6

## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 3A - I-66 HOV Facilities Enhancement

| SEE Factor Group | Potential to Result in Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | Low | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | Low | X | | | Low | High | High | No |
| ● Parklands | Low | X | | | Low | High | High | No |
| ● Community Disruption | Low | X | | | Low | High | High | No |

Source: BRW, Inc.

effects on adjacent properties and resources. Based upon the current level of information available, combined with the preliminary findings of corridor reconnaissance, no factors related to the community context or natural environment have been noted which preclude further consideration of this alternative.

Alternative No. 3B - Extend HOV Lanes Beyond Gainesville:

Table 7 summarizes the results of the environmental screening conducted for Alternative 3B. Improvements along I-66 generally have a low potential to affect SEE factors, while those along Route 29 have a higher potential to result in impacts because of land acquisition required to accommodate facility improvements. Impacts to SEE factor groups could result from stream crossings, changes in visual character and noise levels, and proximity of improvements to local communities.

Alternative 3B has the potential to result in impacts to historic properties, as it passes through an area identified by Fairfax and Prince William Counties as having high potential for unrecorded resources, and through areas associated with the Civil War landscape. While the potential effects of Alternative 3B on historic resources will have implications for alternative refinement, identified effects may have the potential to be resolved through careful planning and coordination with appropriate resource agencies to comply with the requirements of Section 4(f) of the U.S. Department of Transportation Act of 1966 and Section 106 of the National Historic Preservation Act.

Based upon the current level of information available, combined with the preliminary findings of corridor reconnaissance, no factors related to the community context or natural environment have been noted which preclude future consideration of this alternative.

Alternative No. 3C - Create Barrier Separated HOV Facility along I-66:

The results of the environmental screening conducted for Alternative 3C are summarized in Table 8. Alternative 3C would require the crossing of streams and associated wetland and floodplain habitats. Although these crossings are not likely to result in substantial impacts to water resources and the aquatic ecosystem, the requirements of Section 404 of the Clean Water Act will have to be addressed as part of future planning. As indicated in Table 8, it is unlikely any rare, threatened and endangered species would be subject to impact by Alternatives 3C, as these resources are more likely to occur in the less disturbed portions of the area.

Alternative 3C has the potential to result in impacts to historic properties, as it passes through an area identified by Fairfax and Prince William Counties as having high potential for unrecorded resources, and through areas associated with the Civil War landscape. While the potential effects of Alternative 3C on historic

TABLE 7

## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 3B - Extend HOV Lanes Beyond Gainesville

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | Medium | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | Medium | X | | | Low | High | High | No |
| ● Parklands | Low | X | | | Low | High | High | No |
| ● Community Disruption | Medium | X | | | Low | Low | High | No |

Source: BRW, Inc.

TABLE 8

# PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 3C - Create Barrier Separated HOV Facility Along I-66

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | High | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | High | | | X | Medium | Medium | High | No |
| ● Parklands | High | | | X | High | Medium | High | No |
| ● Community Disruption | High | | | X | Medium | Low | Medium | No |

Source: BRW, Inc.

resources will have implications for alternative refinement, identified effects may have the potential to be resolved through careful planning and coordination with appropriate resource agencies to comply with the requirements of Section 4(f) of the U.S. Department of Transportation Act of 1966 and Section 106 of the National Historic Preservation Act.

Right-of-way acquisition along I-66 associated with Alternative 3C would result in direct impacts to residential properties and parklands. Other potential impacts on adjacent communities and parklands associated with Alternative 3C would be indirect in character, such as introduction of visual elements or changes in noise levels. Acquisition of residences would occur along I-66 between I-495 and Route 50. Parklands potentially impacted by Alternative 3C could include E.C. Lawrence Park, Izaak Walton Park, Bull Run Regional Park, and Mayhew Park. Any use of property from these parklands will be subject to the requirements of Section 4(f).

Based upon the current level of information available, combined with the preliminary findings of corridor reconnaissance, no factors related to the community context or natural environment have been noted which preclude further consideration of this alternative.

- **Engineering Feasibility/Built Environment**

Alternative No. 3A - I-66 HOV Facility Enhancement:

The HOV access ramps proposed under this alternative are feasible to construct. However, access to the proposed interchange at Stone Road is dependant on the extension of New Braddock Road between Route 28 and Route 29 to connect to Stone Road. This project is included for study in the current CLRP.

Alternative No. 3B - Extend HOV Lanes Beyond Gainesville:

This alternative requires the extension of New Braddock Road between Route 28 and Route 29 to provide access to the proposed HOV interchange at Stone Road as described under Alternative 3A. Construction of the proposed HOV access ramps and extension of the I-66 HOV lanes between Gainesville and Haymarket is feasible.

HOV lanes along Route 29 could be constructed either in the median of Route 29 or by widening to the outside of the existing road. If the roadway is widened to the outside, approximately 20 feet of additional right-of-way along each side would be required. Widening in the median would require no additional right-of-way.

Alternative No. 3C- Barrier Separated HOV Facility Along I-66:

This alternative could generally be constructed within the existing right-of-way available although additional right-of-way is likely to be required for interchange reconstruction. Expansion of the roadway is likely to require additional retaining wall to avoid the need for right-of-way takings. The project is feasible to construct. This alternative requires the extension of New Braddock Road between Route 28 and Route 29 to provide access to the proposed HOV interchange at Stone Road as described under Alternative 3A. This alternative would require relocation of the I-66 rest areas at Bull Run which is included in the CLRP.

- **Cost**

Alternative No. 3A - I-66 HOV Facility Enhancement:

The cost of constructing Alternative 3A has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. The cost of constructing alternative 3A is estimated to be approximately $25 million (1995 $).

Alternative No. 3B - Extend HOV Lanes Beyond Gainesville:

The cost of constructing Alternative 3B has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. The cost of constructing alternative 3B is estimated to be approximately $50 to $55 million (1995 $).

Alternative No. 3C- Barrier Separated HOV Facility Along I-66:

The cost of constructing Alternative 3C has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. The cost of constructing alternative 3C is estimated to be approximately $525 million (1995 $).

## Findings

All of the HOV alternatives should be retained for further refined definition, analysis and evaluation.

## 4.4 ROADWAY IMPROVEMENTS - ALTERNATIVE 4

### Definition

The roadway improvement alternative would provide additional single-occupant vehicle (SOV) capacity either on I-66 or in parallel roadway corridors. Additional capacity can be provided either through general roadway widening or through intersection improvements on arterial routes.

### Refinement of Alternatives

*Alternative No. 4A - I-66 Roadway Improvements*

This alternative would reconstruct I-66 to current VDOT and AASHTO geometric standards from I-495 to Route 50 and add an additional general purpose travel lane. In each direction, reconstructed I-66 would have inside and outside shoulders, four 12-foot general purpose travel lanes and a 12-foot HOV lane separated from the general lanes by a 6-foot safety buffer.

*Alternative No. 4B - Upgrade Routes 29 and 50 to Super Arterials*

Under this alternative, Routes 29 and 50 would be upgraded to a basic six-lane section and grade separations would be provided at major intersections. Direct access to these routes would generally be restricted and frontage roads would be provided for property access. The improvements would generally extend from I-495 on the east to Route 28 on the west.

Along Route 29, improvements would extend from approximately Fairfax Circle on the east to Route 28 on the west. East of Fairfax Circle, Route 29 has already been widened to six lanes to Merrifield. Between Merrifield and Falls Church, Route 29 is basically a collector street with a commercial orientation. Widening of this segment of Route 29 may provide some relief for I-66 inside the beltway but is unlikely to affect traffic on I-66 outside the beltway. Therefore, this alternative does not include improvements to Route 29 east of Fairfax Circle.

Grade separations in the form of urban diamond interchanges are expected to be constructed at the following locations:

- Blake Lane/Route 50
- Fairfax Circle
- Route 123/Route 50
- Kamp Washington (Routes 29/50/236)
- Shirley Gate Road/Route 50
- Shirley Gate Road/Route 29
- Government Center Parkway/Route 29
- Clifton Road/Route 29

- Walney (Centreville) Road/Route 50
- Stringfellow Road/Route 50

*Alternative No. 4C - Maximum Road System Improvement*

This alternative is a combination of Alternatives 4A and 4B.

## Screening/Evaluation

- **Natural Environment and Community Context**

Alternative 4A - I-66 Roadway Improvements:

The results of the environmental screening conducted for Alternative 4A are summarized in Table 9. Alternative 4A would require the crossing of a few streams and the associated wetland and floodplain habitats. Even though impacts are expected to be minimal as the streams are already traversed by existing roadways, the requirements of Section 404 of the Clean Water Act would have to be addressed as part of future planning. As indicated in Table 9, it is unlikely any rare, threatened and endangered species would be subject to impact by Alternative 4A, as these resources are more likely to occur in the less disturbed portions of the study area.

Right-of-way acquisition along I-66 associated with Alternative 4A would result in direct impacts to residential properties and one parkland area. Other potential impacts on adjacent communities and parklands associated with Alternative 4A would be indirect in character, such as changes in noise levels or in the visual character adjacent to the corridor. Acquisition of residences would occur along I-66 between I-495 and Route 50. Parkland impacted by Alternative 4A would be from South Side Park. Any use of property from this park would be subject to the requirements of Section 4(f) of the U.S. Department of Transportation Act of 1966.

Based on the current level of information available, combined with the preliminary findings of corridor reconnaissance, at this time no factors related to the community context or natural environment have been noted which preclude further consideration of this alternative.

Alternative 4B - Upgrade Routes 29 and 50 to Super Arterials:

The results of the environmental screening conducted for Alternative 4B are summarized in Table 10. Alternative 4B would require several crossings of streams and associated wetland and floodplain habitats. Although these crossings are not likely to result in substantial impacts to water resources and the aquatic ecosystem, the requirements of Section 404 of the Clean Water Act would have to be addressed as part of future planning. As indicated in Table 10, it is unlikely

TABLE 9

## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 4A - I-66 Roadway Improvements

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | Medium | | | X | Low | High | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | Low | X | | | Low | High | High | No |
| ● Parklands | Low | X | | | Low | Medium | High | No |
| ● Community Disruption | High | | | X | Medium | Low | Medium | No |

Source: BRW, Inc.

TABLE 10

## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 4B - Upgrades Routes 29 and 50 to "Super Arterials"

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | High | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | Low | X | | | Low | High | High | No |
| ● Parklands | High | | | X | Medium | Low | High | No |
| ● Community Disruption | High | | | X | High | Low | Low | Yes |

Source: BRW, Inc.

any rare, threatened and endangered species would be subject to impact by Alternative 4B, as these resources are more likely to occur in the less disturbed portions of the study area.

Right-of-way acquisition along both Lee Highway (Route 29) and Lee Jackson Memorial Highway (Route 50) associated with Alternative 4B would result in direct impacts to residential and business properties and parklands. Other potential impacts on adjacent communities and parklands associated with Alternative 4B would be indirect in character, such as changes in noise levels and in the visual elements for land uses adjacent to these corridors. Acquisition of residences would occur along Route 29 between Kamp Washington and Clifton Road and along Route 50 between I-66 and Route 28. Acquisition of businesses would occur along Route 29 between Kamp Washington and Route 28 and along Route 50 between Vienna Metro and Route 28. Parklands impacted by Alternative 4B include Towers Park, Draper Drive Park, and Piney Branch Stream Valley Park. Any use of property from these parks would be subject to the requirements of Section 4(f) of the U.S. Department of Transportation Act of 1966.

Based upon the current level of engineering available, combined with the preliminary findings of corridor reconnaissance, at this time it appears that the community disruption associated with Alternative 4B could be so great that this alternative might not be viable. Table 10 indicates that the degree of community disruption under Alternative 4B is high and that the potential to avoid, minimize or mitigate the impacts is low. These findings reflect that the level of right-of-way acquisition and the magnitude of direct impacts to residential and business properties that would occur along Routes 29 and 50 provide sufficient cause to eliminate Alternative 4B from further consideration.

Alternative 4C - Maximum Road System Improvement:

The results of the environmental screening conducted for Alternative 4C are summarized in Table 11. Alternative 4C would require several crossings of streams and associated wetland and floodplain habitats. Although these crossings are not likely to result in substantial impacts to water resources and the aquatic ecosystem as the streams are already traversed by existing roadways, the requirements of Section 404 of the Clean Water Act would have to be addressed as part of future planning. As indicated in Table 11, it is unlikely any rare, threatened and endangered species would be subject to impact by Alternative 4C, as these resources are more likely to occur in the less disturbed portions of the study area.

Right-of-way acquisition along I-66 and Lee Highway (Route 29) and Lee Jackson Memorial Highway (Route 50) under Alternative 4C would result in direct impacts to residential and business properties and parklands. Other potential impacts on adjacent communities and parklands associated with Alternative 4C would be indirect in character, such as changes in noise levels and in the visual elements adjacent to these corridors. Acquisition of residences would occur along

TABLE 11
## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 4C - Maximum Roadway System Improvement

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| ***Natural Environment*** | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | High | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| ***Community Context*** | | | | | | | | |
| ● Historic Resources | Low | X | | | Low | High | High | No |
| ● Parklands | Low | X | | | Medium | Low | High | No |
| ● Community Disruption | High | | | X | High | Low | Low | Yes |

Source: BRW, Inc.

I-66 between I-495 and Route 50, along Route 29 between Kamp Washington and Clifton Road and along Route 50 between I-66 and Route 28. Acquisition of businesses would occur along Route 29 between Kamp Washington and Route 28 and along Route 50 between Vienna Metro and Route 28. Parklands impacted by Alternative 4C include: South Side Park along I-66; Towers Park, and Piney Branch Stream Valley Park along Route 29; and Draper Drive Park along the combined Route 29/50 alignment west of Fairfax Circle. Any use of property from these parks would be subject to the requirements of Section 4(f) of the U.S. Department of Transportation Act of 1966.

Based upon the current level of engineering available, combined with the preliminary findings of corridor reconnaissance, at this time it appears that the community disruption associated with Alternative 4C could be so great that this alternative might not be viable. Table 11 indicates that the degree of community disruption under Alternative 4C is high and that the potential to avoid, minimize or mitigate the impacts is low. These findings reflect that the level of right-of-way acquisition and the magnitude of direct impacts to residential and business properties that would occur along Routes 29 and 50 provide sufficient cause to eliminate Alternative 4C from further consideration.

- **Engineering Feasibility**

Alternative No. 4A - I-66 Roadway Improvements:

This alternative requires major reconstruction of I-66 from I-495 to Route 50. Additional right-of-way ( a strip 0 to 40 feet wide) is likely to be required along I-66 between I-495 and the Vienna Metrorail station. Expansion of the roadway is likely to require additional retaining wall to minimize right-of-way takings. Roadway widening will displace existing structural walls and noise walls. Existing interchanges and overpasses will need to be reconstructed to allow for roadway widening. Additional right-of-way may be required for interchange reconstruction.

All of the elements of this alternative appear to be feasible to construct.

Alternative No. 4B - Upgrade Routes 29 and 50 to Super Arterials:

This alternative will require substantial additional right-of-way to construct. Along Route 29/50 between the Vienna Metrorail station and I-66, approximately 130 feet of additional right-of-way would be required. The majority of this right-of-way is in the City of Fairfax and obtaining the right-of-way would displace numerous existing businesses.

Along Route 29 west of Kamp Washington, approximately 100 feet of additional right-of-way would be required. Additional right-of-way would be required to construct grade separated urban interchanges.

If right-of-way can be obtained, the construction of this alternative appears to be feasible.

Alternative No. 4C - Maximum Road System Improvement:

This alternative is a combination of alternative 4A and 4B and appears to be feasible to construct.

- Cost

Alternative No. 4A - I-66 Roadway Improvements:

The cost of constructing Alternative 4A has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. The cost of constructing alternative 4A is estimated to be approximately $225 million (1995 $).

Alternative No. 4B - Upgrade Routes 29 and 50 to Super Arterials:

The cost of constructing Alternative 4B has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. The cost of constructing alternative 4B is estimated to be approximately $300 million (1995 $).

Alternative No. 4C - Maximum Road System Improvement:

The cost of constructing Alternative 4C has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. The cost of constructing alternative 4C is estimated to be approximately $510 million (1995 $).

## Findings

Alternative 4A should be retained for further refined definition, analysis and evaluation.

The community disruption caused by the additional right-of-way required to implement Alternative 4B is cause to eliminate Alternative 4B from additional consideration.

Alternative 4C should also be eliminated because of community disruption.

## 4.5 VIRGINIA RAILWAY EXPRESS (VRE) - ALTERNATIVE 5

### Definition

Commuter rail service currently exists in the I-66 Corridor, and therefore merits consideration as one of the possible investments to improve future mobility in the I-66 Corridor. The Virginia Railway Express (VRE) currently operates commuter rail service between Broad Run/Manassas Airport and Washington, D.C., and between Fredericksburg and Washington, D.C. The Northern Virginia Transportation Commission and Potomac and Rappahannock Transportation Commission sponsor and assist in funding the commuter rail service. Between Broad Run/Manassas Airport and Alexandria, this service is operated by agreement with the Norfolk Southern Corporation (NS), which owns the rail right-of-way roughly paralleling the I-66 corridor. Excess rail transport capacity is available on the Norfolk Southern right of way for expansion of VRE service, and extension of service to points on the I-66 corridor (Gainesville and Haymarket) could be possible on the Northern Southern B Line.

A Railroad Alignment Improvement Study, sponsored by the Commonwealth of Virginia, is underway to resolve railroad-highway grade crossing problems near Gainesville and in Manassas, and to allow extension of VRE passenger operations to the Gainesville area on the Norfolk Southern B Line, extending from northwest Manassas to Front Royal. This line is presently single track, but it may be possible to add another track for commuter service on the existing Norfolk-Southern right-of-way. Alternatively, the Railroad Alignment Improvement Study may result in a relocation of a portion of the Norfolk Southern B Line, leaving the existing portion of the B Line for commuter rail service.

### Refinement of Alternatives

**Alternative No. 5 - Extend VRE Service to Gainesville and Haymarket**

Alternative 5 assumes the use the existing Norfolk Southern B Line, which extends from Manassas westward to Front Royal. This alternative would branch off the existing VRE Manassas Line south of the intersection of Route 28 and the 234 By-Pass to provide service to Gainesville and Haymarket as shown on Figure 10. Proposed stations in Gainesville and Haymarket would serve commuters in the U.S. Route 29 and I-66 corridors. Peak hour/peak direction service would be every 40 minutes, providing an effective frequency of one train every 20 minutes east of Manassas. Reverse peak operations would be provided on an hourly frequency, and midday operations on a 60 minute frequency.

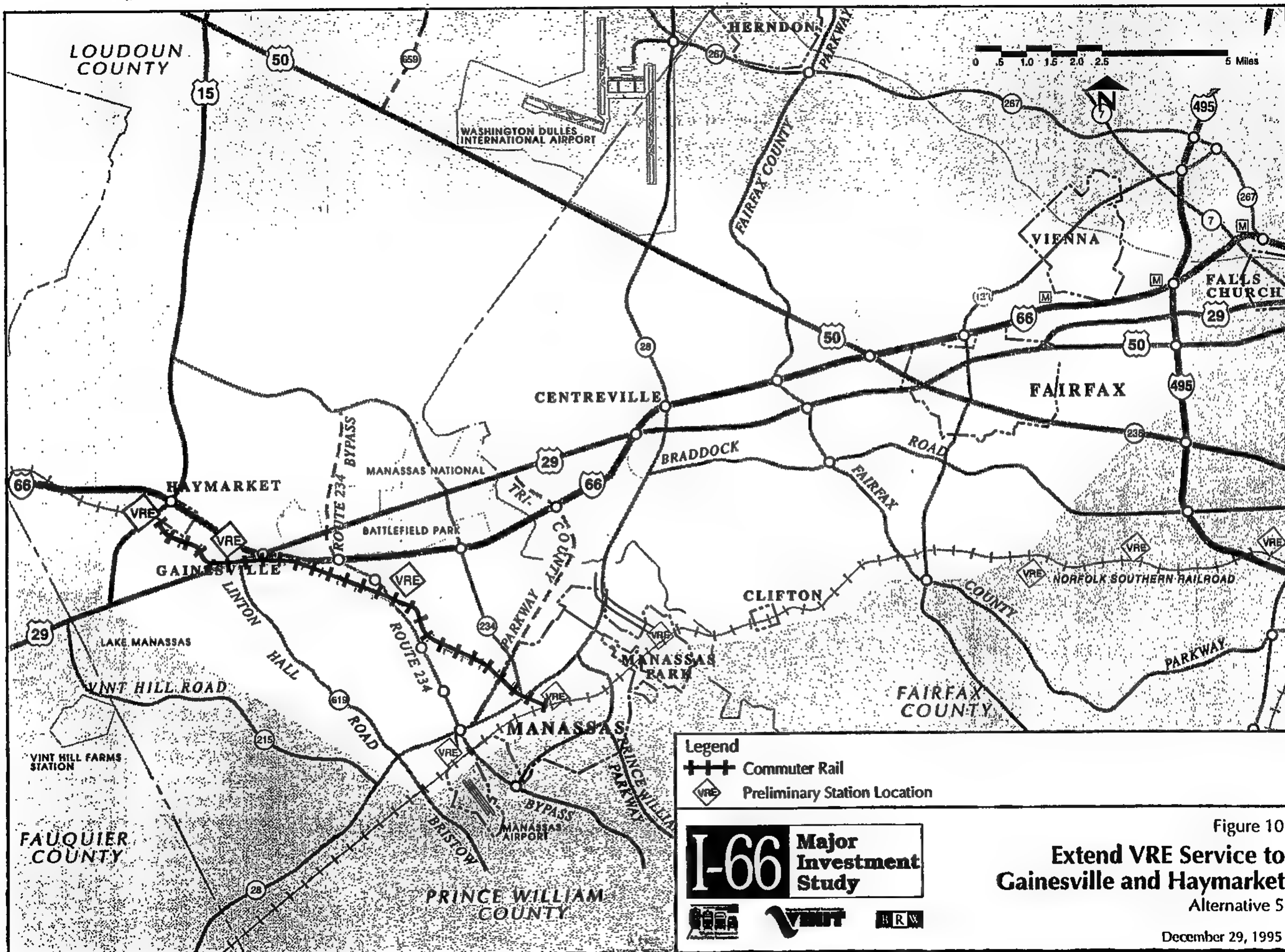



Figure 10

**Extend VRE Service to Gainesville and Haymarket**

Alternative 5

December 29, 1995

## Screening/Evaluation

- **Natural Environment and Community Context**

  Table 12 summarizes the results of the environmental screening conducted for Alternative 5. Overall, this alternative has a low potential to effect SEE factors, as improvements are confined largely to the existing Railroad right-of-way and station areas would require a maximum of 3 to 4 acres for parking facilities. Impacts are most likely to be indirect in character, such as a changes in noise levels or introduction of new visual elements (station facilities) into the landscape. It is unlikely that such impacts would be substantial, given the limited scale of physical improvements associated with this alternative. Based upon the current level of information available, combined with the preliminary findings of corridor reconnaissance, no factors related to the community context or natural environment have been noted which preclude future consideration of this alternative.

- **Engineering Feasibility/Build Environment**

  In order to implement this alternative, an agreement would be required with Norfolk Southern, the owners of the right-of-way. In addition, this alternative would require implementation of the Manassas Rail Relocation Project.

  Physical improvements required to extend commuter rail operations to Gainesville and Haymarket (to the west of Manassas), would include passenger stations, and possibly sidings for overnight storage of trains at or near the last passenger station on the line. Possible station locations along the Norfolk Southern B Line between Manassas and Gainesville include at the 234 Bypass, Gainesville, and West Haymarket. Based upon field reconnaissance and a review of published map sources, it appears that suitable sites for stations exist at these locations.

- **Costs**

  The cost to extend VRE service to Gainesville and Haymarket is estimated based on current (1995 $) VRE system costs. The cost associated with Alternative 5 is as follows:

| | |
|---|---|
| Stations (3) | $ 3,000,000 |
| Station Parking (3 @ 200 spaces @$2,500) | 1,500,000 |
| Layover Spur Track | 2,000,000 |
| Locomotives (4) | 8,800,000 |
| Cars (9) | 13,500,000 |
| TOTAL | $28,800,000 |
| Round To: | $30,000,000 |

TABLE 12
## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 5 - Extend VRE Service to Gainesville and Haymarket

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| ***Natural Environment*** | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | Medium | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| ***Community Context*** | | | | | | | | |
| ● Historic Resources | Low | X | | | Low | High | High | No |
| ● Parklands | Low | X | | | Low | High | High | No |
| ● Community Disruption | Low | X | | | Low | High | High | No |

Source: BRW, Inc.

## Findings

As stated above, the commuter rail alternative must be acceptable to the rail right of way owner, Norfolk Southern Corporation. A copy of this evaluation is being provided to Norfolk Southern Corporation for comment.

Based upon presently-known data, the commuter rail alternative is feasible and should be retained for further refined definition, analysis and evaluation.

# 4.6 LIGHT RAIL TRANSIT SERVICE - ALTERNATIVE 6

## Definition

Light Rail Transit (LRT) Service is fixed guideway technologies other then Commuter Rail or Metro Rail for use in the urban or suburban environment. Light rail systems provide the opportunity for lower capital and/or operating costs. LRT service is distinguished by its ability to operate at-grade in separated or non-separated right-of-ways, simpler station designs and lower operating costs.

## Refinement of Alternatives

*Alternative No. 6A - Light Rail Transit to Dulles International Airport (IAD)*

The Alternative 6A alignment would begin on the east end of the study corridor at the existing Vienna Metrorail Station (Figure 11). The light rail cross-section for the alignment requires a minimum of 28 feet to provide two tracks. The alignment would proceed from a proposed intermodal transfer station southwest in the median of I-66 to a station in the vicinity of Jermantown Road. Outbound of the Jermantown Station, the alignment would continue in a westerly direction in the I-66 median until just west of the intersection of I-66 and Route 50. In the vicinity of the Fair Oaks Mall/Government Center, a center platform station would be built in the I-66 median, with vertical access to a connecting pedestrian bridge to the Fair Oaks Mall (Fair Oaks).

Outbound of the Fair Oaks station, the alignment would continue at-grade in the I-66 median past the West Ox Road Bridge. Immediately west of the bridge, the alignment would continue on structure and swing over the westbound lanes of I-66. Immediately after clearing the roadway, the alignment would descend and continue at-grade into the median of the Fair Lakes Parkway east of the Corporate Parkway/Oak Creek Lane intersection before entering the Fair Lakes East station. After leaving the Fair Lakes East station, the alignment would continue in a westerly direction to the Fairfax County Parkway before curving to the north into the median of the Parkway. The light rail alignment would continue north in the median of the Fairfax County Parkway to a Fair Lakes West station in the vicinity of where the Fairfax County Parkway and Route 50 intersect. After leaving the Fair Lakes West station, the alignment would descend to pass underneath the interchange of Route 50 and the Fairfax County Parkway, before curving to the northwest and proceeding in the median of Route 50.

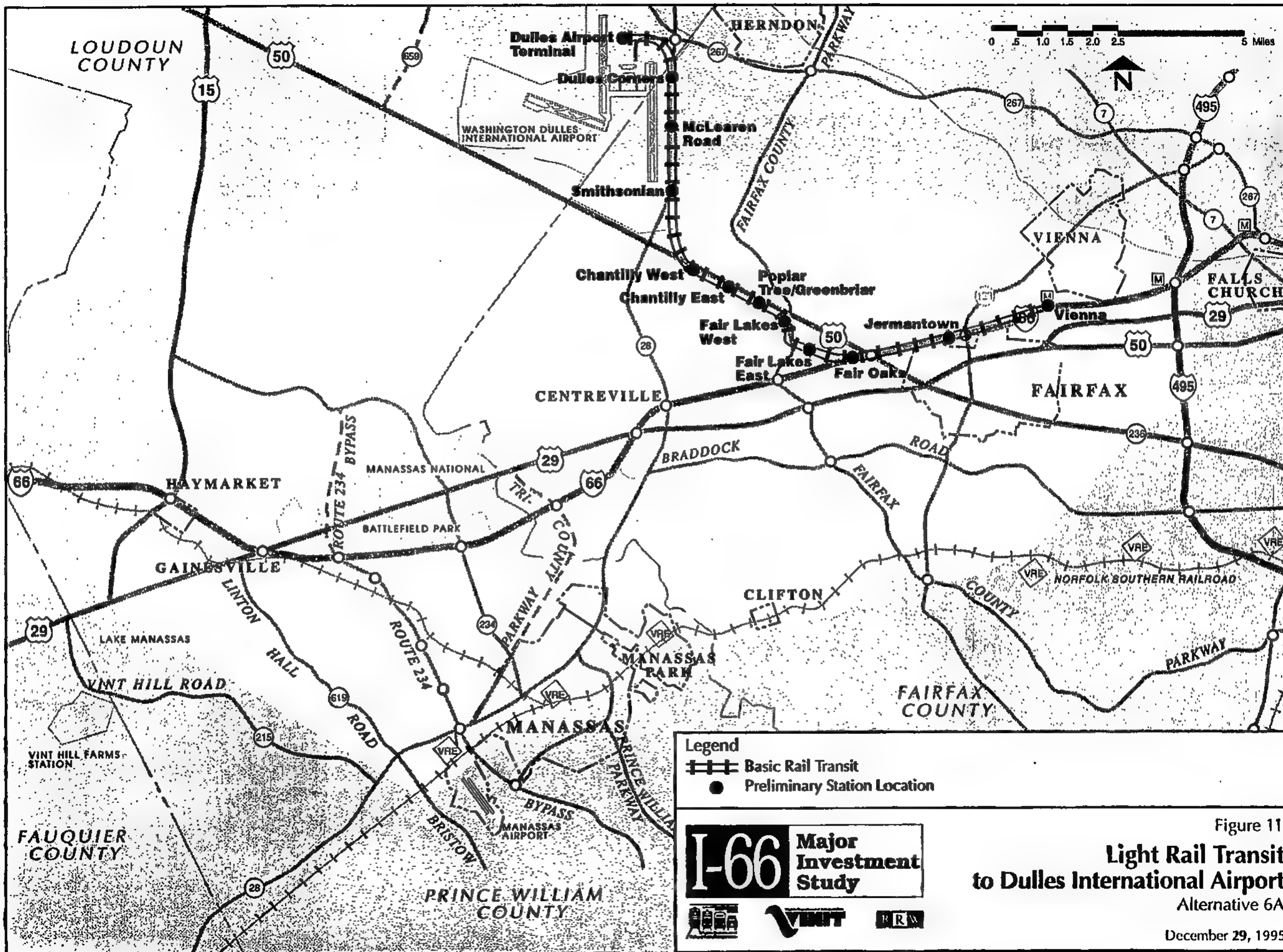



Figure 11
**Light Rail Transit to Dulles International Airport**
Alternative 6A
December 29, 1995

The alignment would rise to grade in the median of Route 50 and proceed in the median to the intersection of Route 50 and Centreville Road (Route 657). Along this stretch of Route 50, there would be three stations, one in the vicinity of Poplar Tree/Greenbriar, and two near Chantilly. At Centreville Road, the alignment would curve to the north and proceed following the right of way until Wall Road. At Wall Road the alignment would turn to the northwest to follow on the west side of Wall Road to Sully Road (Route 28). The Smithsonian/Air Space Museum Station would be located in this area on Dulles Airport property.

At Sully Road, the alignment would head north at-grade, following on the east side of Sully Road to a station in the vicinity of the intersection of McLearen Road and Sully Road. Outbound of the McLearen Road Station, the alignment would continue north to a station at Dulles Corners (intersection of Sully Road and the Dulles Toll Road). Outbound of a station at Dulles Corners, the alignment would follow the access road from the airport, cross the interchange ramps behind the bridge abutments and continue into the median of the access road to the Valet parking area in front of the main terminal. An at-grade stub end platform would be located to the north of the parking area, within a portion of the valet parking lot.

As described above, a total of twelve stations are proposed for this alternative, located primarily at intersections along I-66, Route 50, and Sully Road (Route 28). The general locations of the twelve stations are indicated in Figure 11. These are (listed from east to west):

- Vienna Metrorail/Light Rail Intermodal Station (I-66 Median)
- Jermantown Road
- Fair Oaks
- Fair Lakes East
- Fair Lakes West
- Poplar Tree/Greenbriar
- Chantilly East
- Chantilly West
- Smithsonian/Air Space Museum
- McLearen Road
- Dulles Corners
- Dulles Airport Terminal

At the Vienna Metrorail/Light Rail Intermodal Station, an intermodal light rail passenger transfer will be constructed, with the light rail platform elevated over the existing metrorail platform. Two of the other proposed stations would be center platform at-grade stations with an elevated mezzanine within the median of I-66 (Jermantown Road and Fair Oaks). The remainder would be at-grade platforms, most which would be located either in the median of Route 50 or along the east and west side of Sully Road. Typical stations would consist of two side platforms off-set (one on each side of the intersection) to minimize the width of the right of way. This type of station arrangement requires a

minimum of approximately 36 feet to construct within the median of the roadway. The proposed Smithsonian station would be located within the property of Dulles Airport at-grade.

*Alternative No. 6B - Light Rail Transit to Centreville/Manassas*

Under Alternative 6B, light rail service would begin at a station located opposite the Metrorail Vienna Station on Saintbury Drive (Figure 12). The alignment would follow Saintbury Drive to head south on Nutley Street to Lee Highway (Route 29). At Lee Highway, the alignment would curve to the west, and follow in the center of the roadway to a station in the vicinity of Fairfax Circle. The alignment would then continue southwesterly in the center of Lee Highway (Routes 29/50) to Centreville Road (Route 28). Stations along this stretch of alignment would be located in the vicinity of Chain Bridge Road, the Kamp Washington Shopping Center, the Fairfax County Government Center, Fairfax County Parkway, and Clifton Road.

At Centreville Road, the alignment would leave Lee Highway and turn southbound into the median of Centreville Road to a Centreville station north of New Braddock Road, and then proceed south in the median of Centreville Road towards Manassas. Before passing through the Village of Yorkshire, the alignment would pass through a station in the vicinity of the intersection of Compton Road and Centreville Road. Another station would be located south of the Village of Yorkshire in the vicinity of the Manassas Park Drive and Centreville Road intersection. At Manassas Drive, the alignment would curve to the east, and follow Manassas Drive to the existing Virginia Railway Express Commuter Rail Station and Manassas Park City Hall. A Manassas Park station with park-and-ride as well as kiss-and-ride facilities would be constructed opposite the existing VRE station. Given the industrial character of the property today, this area could be suitable for the siting of a maintenance facility.

As described above, a total of eleven stations are proposed for this alternative, located primarily at intersections along Lee Highway (Routes 29 and 50) and Centreville Road (Route 28). The general locations of the eleven stations are indicated in Figure 12. These are (listed from east to west):

- Vienna Metrorail/Light Rail Intermodal Station (I-66 Median)
- Fairfax Circle
- Chain Bridge Road
- Kamp Washington
- Government Center
- Fairfax County Parkway
- Clifton Road
- Centreville
- Compton Road
- Manassas Park Drive
- Manassas Park

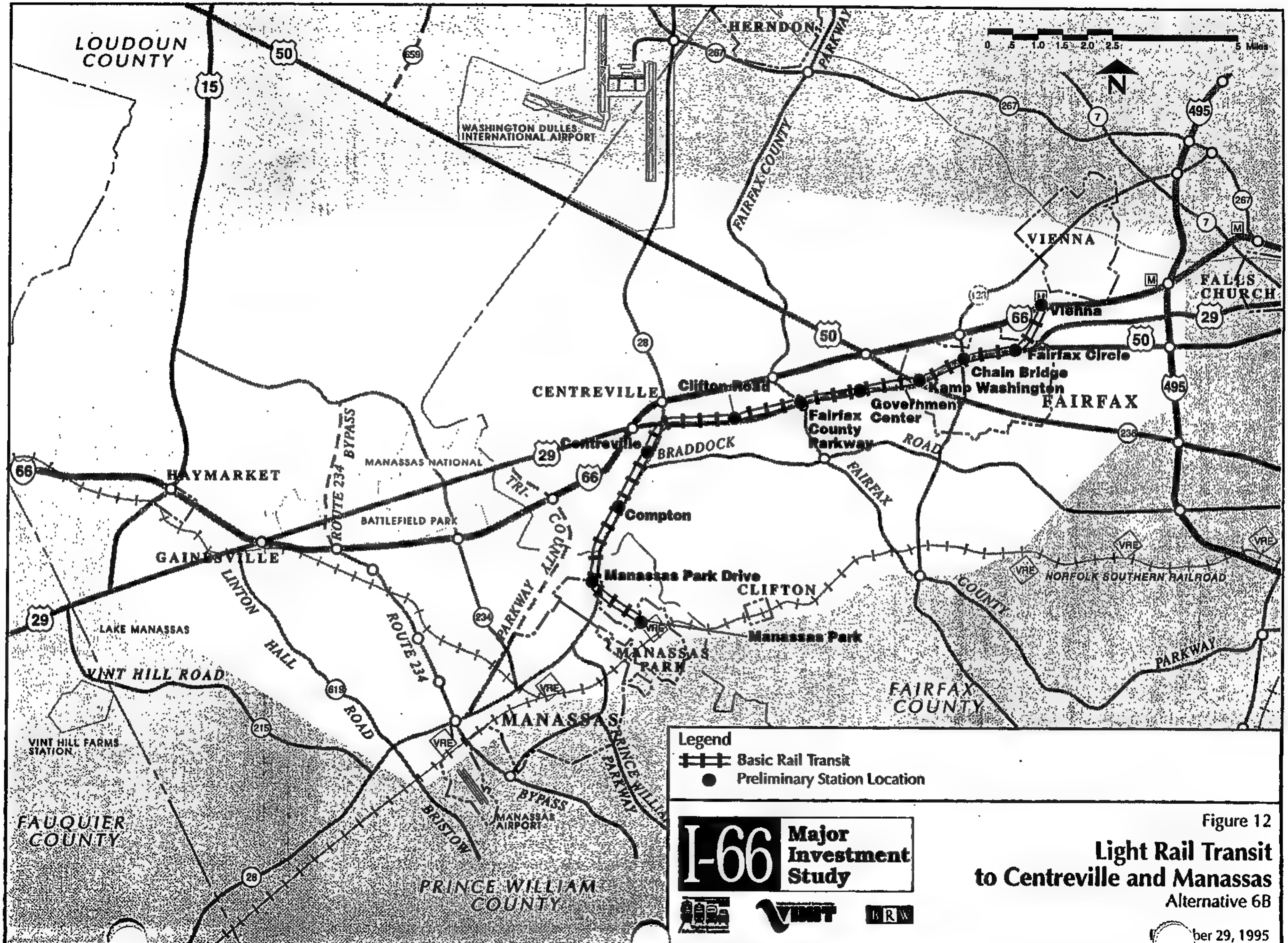



Figure 12
**Light Rail Transit to Centreville and Manassas**
Alternative 6B

ber 29, 1995

At the Vienna Metrorail/Light Rail Intermodal Station, an at-grade light rail station would be constructed on the south side of the existing station within the park-and-ride facility. Access to the facility from the metrorail station would be via the existing pedestrian bridge over the eastbound lanes of I-66. All of the stations would be at-grade with off-set side platform facilities. The at-grade stations under this alternative would be similar to those described for Alternative 6A with low platforms in an off-set configuration at intersections.

*Alternative No. 6C - Light Rail Transit to Dulles International Airport and Centreville/Manassas*

Under this alternative the alignments and stations of both the Light Rail Transit to Dulles International Airport (Alternative 6A) and Centreville/ Manassas (Alternative 6B) would be constructed (Figure 13). The alignment to IAD would be the same as described for Alternative 6A and the alignment to Centreville/Manassas would be the same as that described for Alternative 6B. A total of twenty-two stations would be constructed with Alternative 6C, in the same locations as described for Alternative 6A and Alternative 6B (Figure 13). For the Vienna Metrorail/Light Rail Intermodal Station, an at-grade light rail station would be constructed on the south side of the existing station within the park-and-ride facility. Access to the facility from the metrorail station would be via the existing pedestrian bridge over the eastbound lanes of I-66. The combination of Alternatives 6A and 6B into Alternative 6C provides for continuous light rail service between Dulles International Airport and Manassas Park.

## Screening/Evaluation

- **Natural Environment/Community Context**

  Alternative No. 6A - Light Rail Transit to Dulles International Airport (IAD):

  The results of the environmental screening conducted for Alternative 6A are summarized in Table 13. Alternative 6A would require the crossing of several streams and associated wetland and floodplain habitats. Although these crossings are not likely to result in substantial impacts to water resources and the aquatic ecosystem since the streams are already traversed by existing roadways, the requirements of Section 404 of the Clean Water Act would have to be addressed as part of future planning. As indicated in Table 13, it is unlikely any rare, threatened and endangered species would be subject to impact by Alternatives 6A, as these resources are more likely to occur in the less disturbed portions of the study area.

  The areas traversed by Alternative 6A along I-66 and Route 50 are not considered to have a high potential for unrecorded resources. Alternative 6A would pass through both the Sully Historic District and the Washington Dulles International Airport Historic District. While the potential effects of Alternative 6A on these recognized historic resources would have significant implications for alternative refinement, the identified effects may have the potential to be resolved through

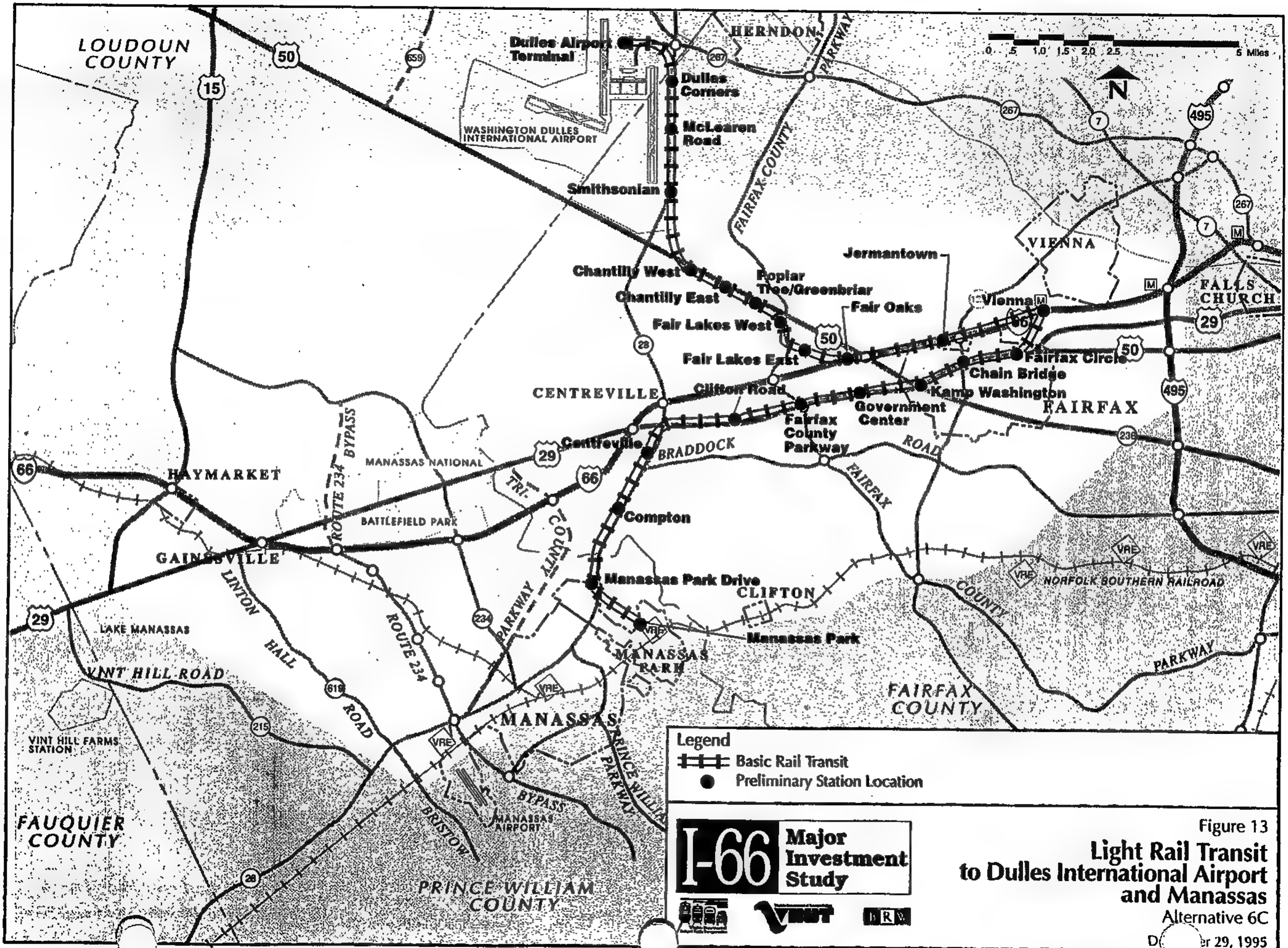



Figure 13
**Light Rail Transit to Dulles International Airport and Manassas**
Alternative 6C
D[illegible]er 29, 1995

TABLE 13

## PRELIMINARY SEE FACTORS SCREENING

## ALTERNATIVE 6A - Light Rail Transit to Dulles International Airport (IAD)

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | High | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | High | | | X | Medium | Low | High | No |
| ● Parklands | Low | X | | | Low | High | High | No |
| ● Community Disruption | High | | | X | Medium | Low | Low | No |

Source: BRW, Inc.

careful planning and coordination with appropriate resource agencies to comply with the requirements of Section 4(f) of the U.S. Department of Transportation Act of 1966 and Section 106 of the National Historic Preservation Act.

Although a number of parklands are located in the vicinity of Alternative 6A, none of these resources are located in close enough proximity to Alternative 6A to result in direct effects. Table 13 notes that the potential for indirect effects (noise, visual) is low.

Alternative 6A has a high potential to result in both direct and indirect community impacts. Although rail facilities improvements will be largely limited to established transportation corridors (with the exception of station areas), residential and business displacements will be required for interchange modifications to accommodate light rail improvements. Affected areas are along I-66 between Vienna Metro and Route 50, and along Route 50 between Fairfax County Parkway and Route 28. Other potential impacts on adjacent communities associated with Alternative 6A are indirect in character, such as introduction of visual elements or changes in noise levels.

Based upon the current level of engineering available, combined with the preliminary findings of corridor reconnaissance, at this time no factors related to the natural environment and the community context have been noted which preclude further consideration of this alternative.

Alternative No. 6B: Light Rail Transit to Centreville/Manassas:

The results of the environmental screening conducted for Alternative 6B are summarized in Table 14. Alternative 6B would require the crossing of a few streams and associated wetland and floodplain habitats, including Bull Run. Although these crossings are not likely to result in substantial impacts to water resources and the aquatic ecosystem as the streams are already traversed by existing roadways, the requirements of Section 404 of the Clean Water Act would have to be addressed as part of future planning. As indicated in Table 14, it is unlikely any rare, threatened and endangered species would be subject to impact by Alternatives 6B, as these resources are more likely to occur in the less disturbed portions of the study area.

Alternative 6B will traverse areas along Route 50, I-66, Route 28 which are considered to have a high potential for unrecorded resources. Alternative 6B would pass through historic landscapes associated with Civil War activities. Therefore, as indicated in Table 14, the potential for 6B to cause both direct and indirect effects to historic resources is medium. While the potential effects of Alternative 6B on historic resources would have significant implications for alternative refinement, identified effects may have the potential to be resolved through careful planning and coordination with appropriate resource agencies to comply with the requirements of Section 4(f) of the U.S. Department of Transportation Act of 1966 and Section 106 of the National Historic Preservation

TABLE 14

## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 6B - Light Rail Transit to Centreville/Manassas

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | High | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | Medium | | | X | Low | Medium | High | No |
| ● Parklands | High | X | | | Low | Low | High | No |
| ● Community Disruption | High | | | X | High | Low | Low | Yes |

Source: BRW, Inc.

Act. Based upon the current level of engineering available, combined with the preliminary findings of corridor reconnaissance, the potential effects on historic resources associated with Alternative 6B should not preclude consideration of this alternative.

Alternative 6B would pass through Bull Run Regional Park, requiring compliance with Section 4(f) of the U.S. Department of Transportation Act of 1966. Although a number of other parklands are located in the vicinity of Alternative 6B, most of these resources are not located in close enough proximity to Alternative 6B to be subject to direct impact. Because some parklands are located immediately adjacent to the proposed alignment, the potential for indirect effects (noise, visual) would exist.

Alternative 6B has a high potential to result in community impacts, as right-of-way acquisition and associated displacements would be required to implement this alternative. Business and residential displacements would occur along Lee Highway between Nutley Street and Centreville Road, and along Centreville Road between Centreville and Manassas Park. Because of the existing pattern of development and the presence of sensitive areas immediately adjacent to the likely zone of improvement, indirect impacts are likely to occur.

Based upon the current level of engineering available, combined with the preliminary findings of corridor reconnaissance, at this time it appears that the community disruption associated with Alternative 6B could be so great that this alternative might not be viable. Table 14 indicates that the degree of community disruption under Alternative 6B is high and that the potential to avoid, minimize or mitigate the impacts is low. These findings reflect that the level of right-of-way acquisition and the magnitude of direct impacts to residential and business properties that would occur along Lee Highway and Centreville Road provide sufficient cause to eliminate Alternative 6B from further consideration.

Alternative No. 6C: Light Rail Transit to Dulles International Airport and Centreville/Manassas:

The results of the environmental screening conducted for Alternative 6C are summarized in Table 15. Alternative 6C would require the crossing of several streams and associated wetland and floodplain habitats, including Bull Run. Although these crossings are not likely to result in substantial impacts to water resources and the aquatic ecosystem because the streams are already traversed by existing roadways, the requirements of Section 404 of the Clean Water Act would have to be addressed as part of future planning. As indicated in Table 15, it is unlikely any rare, threatened and endangered species would be subject to impact by Alternatives 6C, as these resources are more likely to occur in the less disturbed portions of the study area.

**TABLE 15**

## PRELIMINARY SEE FACTORS SCREENING

## ALTERNATIVE 6C - Light Rail Transit to Dulles International Airport (IAD) and Centreville/Manassas

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| *Natural Environment* | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | High | | | X | Low | Low | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| *Community Context* | | | | | | | | |
| ● Historic Resources | High | | | X | Medium | Low | High | No |
| ● Parklands | High | | | X | Low | Low | High | No |
| ● Community Disruption | High | | | X | High | Low | Low | Yes |

Source: BRW, Inc.

Alternative 6C would pass through both the Sully Historic District and the Washington Dulles International Airport Historic District, which are both recognized historic resources. In addition, Alternative 6C would traverse areas along Route 50, I-66, Route 28 which are considered to have a high potential for unrecorded resources. Alternative 6C would pass through historic landscapes associated with Civil War activities. While the potential effects of Alternative 6C on these recognized historic resources would have significant implications for alternative refinement, the identified effects may have the potential to be resolved through careful planning and coordination with appropriate resource agencies to comply with the requirements of Section 4(f) of the U.S. Department of Transportation Act of 1966 and Section 106 of the National Historic Preservation Act.

Alternative 6C would pass through Bull Run Regional Park, requiring compliance with Section 4(f) of the U.S. Department of Transportation Act of 1966. Although a number of other parklands are located in the vicinity of Alternative 6C, most of these resources are not located in close enough proximity to Alternative 6C to be subject to direct impact. Because some parklands are located immediately adjacent to the proposed alignment, the potential for indirect effects (noise, visual) exists.

Alternative 6C has a high potential to result in both direct and indirect community impacts. Areas identified for property acquisition are along I-66 between Vienna Metro and Route 50, along Route 50 between Fairfax County Parkway and Route 28, along West Ox Road, along Lee Highway between Nutley Street and Centreville Road and along Centreville Road between Centreville and Manassas Park. Other potential impacts on adjacent communities associated with Alternative 6C would be indirect in character, such as introduction of visual elements or changes in noise levels.

Based upon the current level of engineering available, combined with the preliminary findings of corridor reconnaissance, at this time it appears that the community disruption associated with Alternative 6C could be so great that this alternative might not be viable. Table 15 indicates that the degree of community disruption under Alternative 6C is high and that the potential to avoid, minimize or mitigate the impacts is low. These findings reflect that the level of right-of-way acquisition and the magnitude of direct impacts to residential and business properties that would occur along I-66, Lee Highway and Centreville Road provide sufficient cause to eliminate Alternative 6C from further consideration.

- **Engineering Feasibility/Built Environment**

Alternative No. 6A - Light Rail Transit to Dulles International Airport (IAD):

Under this alignment alternative, property acquisition would occur at proposed station locations along the Route 50 for construction of platforms and station related facilities such as bus stops, park-and-ride and kiss-and-ride facilities.

Utilities currently located within the median of Route 50 would be relocated to either side of the roadway. Based upon the current level of engineering detail, the alternative appears feasible to build and operate.

In addition to the property acquisition along Route 50, Alternative 6A would require the construction of two underpasses. An underpass would be required to facilitate transitioning from I-66 to the Fairfax County Parkway to Route 50. The other underpass would be needed at Centreville Road at Route 50. Both of these underpasses are feasible to construct and operate based upon the current level of engineering detail. The underpasses may require ventilation, which would increase capital and operating costs. At the current level of detail, the assumption is that the underpasses would be sufficiently short so as to avoid this issue.

Alternative No. 6B: Light Rail Transit to Centreville/Manassas:

A significant portion of the alignment route between the Vienna Station and Shirley Gate Road is developed on both sides with narrow medians As a result, this segment of Alternative 6B would require significant property acquisition throughout this area, and may not be feasible to construct given the existing pattern of development. Use of the Lee Highway median west of Shirley Gate Road could limit the property impact on both sides, but the relocation of some businesses would still be required. The only location where light rail transit could be accommodated in the median is through the area presently under construction at Fairfax County Parkway. A few businesses along Lee Highway would be displaced between Clifton Road and Route 28.

The Centreville Road (Route 28) segment of Alternative 6B, while feasible to construct, would involve property acquisition for the alignment as well as the stations in the area of the Village of Yorkshire and parts of the unincorporated sections of Manassas. However, at this level of engineering detail, the segment appears feasible.

Centreville Road has a sufficiently wide median to accommodate light rail transit to the Village of Yorkshire, except for the first half mile where Centreville Road would have to be reconstructed because the median is too narrow. Construction of light rail transit would have the potential to severely impact the business community in the Village of Yorkshire and portions of Manassas Unincorporated. Through the Village of Yorkshire and Manassas Unincorporated, the impact on either side of the right-of-way on businesses and properties would be substantial. Through the Village of Yorkshire, it appears that the commercial strip is a very narrow strip along each side of Centreville Road and light rail transit in-street running in mixed traffic may need to be considered. The same mixed traffic in-street operation may need to be considered for some parts of Unincorporated Manassas.

Through the Village of Yorkshire, it appears it would be feasible to locate light rail transit west of Centreville Road through the Village of Yorkshire to reduce impacts to the business community. In the Unincorporated area of Manassas, this solution does not appear to be possible.

Alternative No. 6C: Light Rail Transit to Dulles International Airport and Centreville/Manassas:

This alternative is the combination of both alternatives 6A and 6B. All of the issues that were discussed in each of the alternatives still would be valid for this alternative.

- **Costs**

Alternative 6A:

The cost of constructing Alternative 6A has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. Rail costs are based upon order of magnitude costs of similar type light rail systems in Portland, Oregon. The cost to construct Alternative 6A is as follows:

| | |
|---|---|
| Roadway | $175 Million |
| Rail | 900 |
| TOTAL | $1,075 Million |

Alternative 6B:

The cost of constructing Alternative 6B has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. Rail costs are based upon order of magnitude costs of similar type light rail systems in Portland, Oregon. The cost to construct Alternative 6B is as follows:

| | |
|---|---|
| Roadway | $425 Million |
| Rail | 630 |
| TOTAL | $1,055 Million |

Alternative 6C:

The cost of constructing Alternative 6C has been estimated based on current (1995 $) construction costs for bridges, ramps and roadways. The estimates include 15 percent for engineering and administration and a 20 percent contingency. The estimates do not include right-of-way costs, business or residential relocations, or utility relocations. Rail costs are based upon order of magnitude costs of similar type light rail systems in Portland, Oregon. The cost to construct Alternative 6C is as follows:

| | |
|---|---|
| Roadway | $600 Million |
| Rail | 1,500 |
| TOTAL | $2,100 Million |

## Findings

### *Alternative 6A*

This alternative with it's suggested alignment refinements is feasible to build and operate. The environmental review performed for this initial screen does not indicate any reason to preclude this option from being built and operated. This alternative should be retained for further engineering development and analysis.

### *Alternative 6B*

This alternative requires extensive widening of the alignment between the Vienna Metro Station and the Shirley Gate Road along Routes 29/50. The amount of widening and resultant property acquisition for both the alignment and stations is deemed to be significant and would probably preclude construction of the alternative. Alignment refinements reviewed to minimize the problem did not improve the problem and generated their own issues including a significant increase in travel time for passengers to and from the Manassas area. Access to George Mason University in Fairfax City using Braddock Road and Forum Road created a weaving alignment impacting narrow roadways with no ability to widen without impacting commercial and residential properties in the immediate vicinity of the University. In addition, this alignment would increase travel times due to slower speed.

Along Route 28, access to the City of Manassas was not possible due to very narrow roadways and no ability of acquiring additional property without destroying historic portions of Manassas City. A recommended refinement would shorten the alignment to Manassas Park Drive and terminate the system at the VRE station in Manassas.

This alternative is not recommended for further consideration due to the significant impacts in constructing along the Routes 29/50 in Fairfax City from Vienna station to Shirley Gate Road.

bridges would be part of the station design to facilitate access to and from the platforms. The Smithsonian Air and Space Museum, the McLearen Road and the Dulles Airport stations would be below grade. All stations would have park-and-ride facilities as well as bus and kiss-and-ride facilities.

The seven stations would be located in the following areas:

- Jermantown Road
- Fair Oaks
- Greenbriar
- Centreville Road
- Smithsonian Air and Space Museum
- McLearen Road
- Dulles Airport Terminal

## Screening and Evaluation

- **Natural Environment/Community Context**

  Alternative No. 7A - Metro-like Rail Extension to Centreville (All in I-66 Median):

  The results of the environmental screening conducted for Alternative 7A are summarized in Table 16. Alternative 7A would require the crossing of a few streams and associated wetland and floodplain habitats which are already traversed by existing roadways. Although these crossings are not likely to result in substantial impacts to water resources and the aquatic ecosystem, the requirements of Section 404 of the Clean Water Act would have to be addressed as part of future planning. As indicated in Table 16, it is unlikely any rare, threatened and endangered species would be subject to impact by Alternative 7A, as these resources are more likely to occur in the less disturbed portions of the study area.

  The areas traversed by Alternative 7A along I-66 are not considered to have a high potential for unrecorded resources. Therefore, as indicated in Table 15, the potential for 7A to cause either direct and indirect effects to historic resources is low.

  Alternative 7A, has a low potential to result in parkland impacts, as few of the parklands in the area traversed by Alternative 7A are in close enough proximity to be affected. The exception is the southernmost extent of Eleanor C. Lawrence Park, which is north of the intersection of I-66 and Route 28. Depending upon the station location, this parkland resource could be subject to direct and/or indirect impacts as a result of Alternative 7A. Any use of property from this parkland would be subject to the provisions of Section 4(f) of the U.S. Department of Transportation Act of 1966.

TABLE 16
## PRELIMINARY SEE FACTORS SCREENING
## ALTERNATIVE 7A - Metro-like Rail Extension to Centreville (All in I-66 Median)

| SEE Factor Group | Potential to Result In Impact | Character of Impact | | | Degree of Impact | Potential to Avoid Impact | Possibility of Minimization/Mitigation | Cause to Eliminate |
|---|---|---|---|---|---|---|---|---|
| | | Indirect | Direct | Both | | | | |
| ***Natural Environment*** | | | | | | | | |
| ● Water Resources/ Aquatic Ecosystem | Medium | X | | | Low | High | High | No |
| ● Rare/Threatened/ Endangered Species | Low | X | | | Low | High | High | No |
| ***Community Context*** | | | | | | | | |
| ● Historic Resources | Low | X | | | Low | High | High | No |
| ● Parklands | Low | X | | | Low | High | High | No |
| ● Community Disruption | High | | | X | Medium | Low | Medium | No |

Source: BRW, Inc.

possibly mitigated. Neither alternative's potential engineering or environ- mental issues are deemed significant enough to preclude their implementation at this level of analysis.

Both alternatives with their recommended alternative refinements are recommended to be retained for further engineering development and analysis as part of this MIS project.

# PURPOSE AND NEED STATEMENT

# I-66 MAJOR INVESTMENT STUDY

## INTRODUCTION

This document represents the initial version of the **Purpose and Need Statement** for the I-66 Major Investment Study. It should be particularly understood by the readers that this will be an evolving element of the overall documentation for this study. The document will be modified and updated as necessary throughout the course of the project and will ultimately be prepared at a level of detail and quality so as to allow for it to serve as the *"Purpose and Need"* chapter of any subsequent environmental document which may be associated with any particular project(s) identified through the course of the study process.

As defined for the purpose of this study, the I-66 MIS Corridor extends from the Capital Beltway (I-495) in Fairfax County, Virginia on the east to U.S. Route 15 in Prince William County on the west. The northern and southern boundaries of the study corridor are defined on Figure 1. The overall corridor is somewhat "pie-shaped," and reflects the boundaries of the geographic area thought to contain the largest portion of the general travel market which utilizes that segment of the study area which lies east of the interchange of U.S. Route 50 with I-66.

Over the past two decades, the I-66 Corridor has been the subject of both extensive technical analysis and the expenditure of considerable sums of money with which to improve the transportation infrastructure. These expenditures have included: the construction of the Metrorail Orange Line stations at Dunn Loring and Vienna; the ongoing widening and reconstruction program for the I-66 mainline from the Capital Beltway west to Route 234 at Manassas; and the construction of the Fairfax County Parkway (Route 7100) across the corridor.

The principal purpose of this assignment is to define the most appropriate transportation investment strategy for the study area which addresses the transportation problems in the area over the next 20-25 years.

As part of the initial problem identification and quantification phase of this project, a number of existing and evolving transportation issues facing the I-66 Corridor have been defined. Each of these is briefly discussed below.

Moreover, it is the areas in western Fairfax County, eastern Loudoun County, and western Prince William County that are anticipated to contribute most of this population change in Northern Virginia. For example, the Upper Potomac, Pohick and Bull Run Planning Districts of western Fairfax County are projected to contribute approximately 49 percent of the total forecast county population increase of about 173,500 persons over the period 1995-2010. This represents a continuation over recently observed trends which saw these same three planning districts contribute 67 percent of the total county population growth of 59,000 persons over the period 1990-1995. The 1990 to 2020 dwelling unit growth by traffic analysis zone (TAZ) and the 2020 dwelling unit by TAZ are shown on Figures 2 and 3.

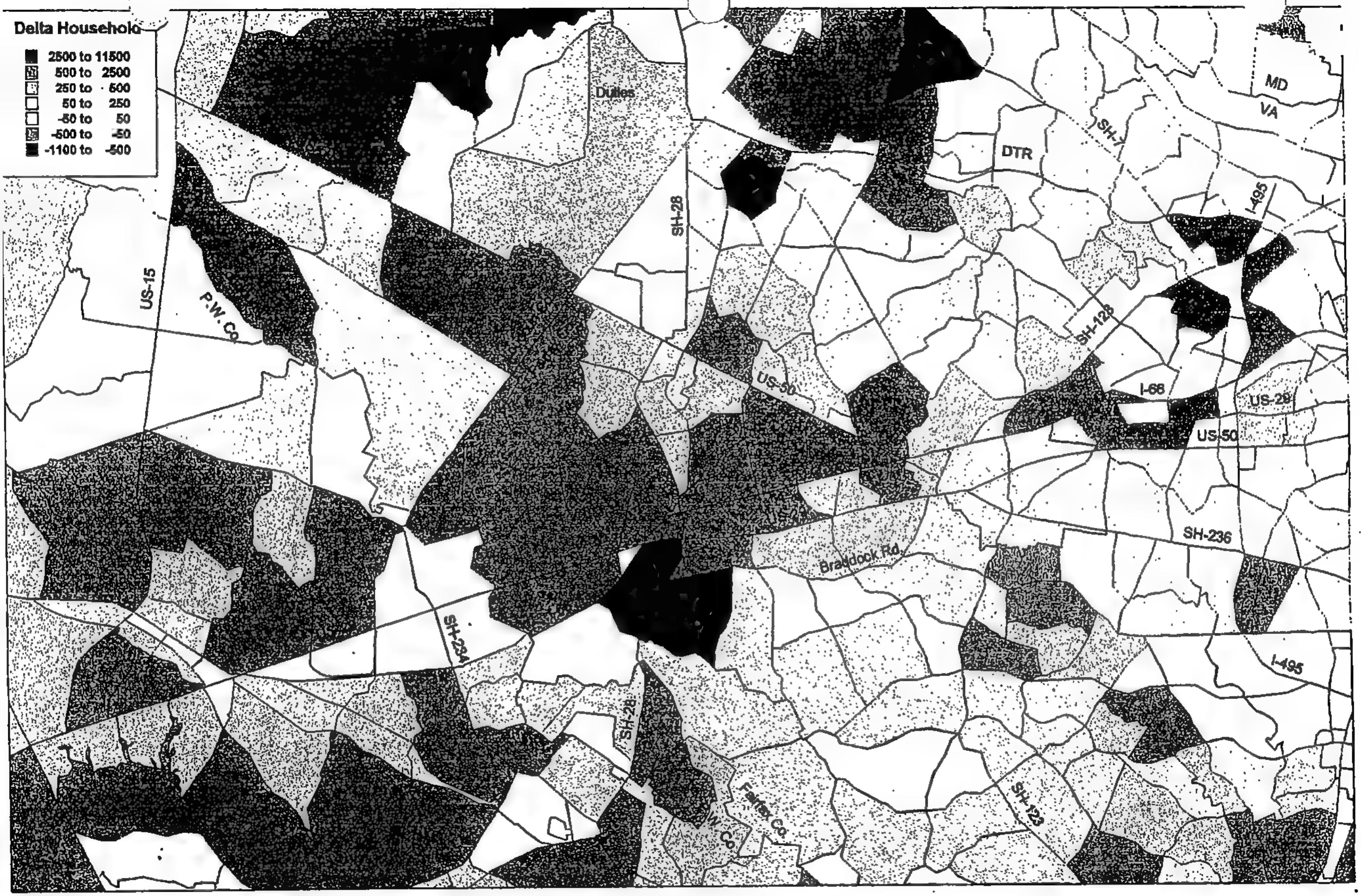
Similar changes have been observed for employment growth as well. Over the period from 1980-1995, employment in Fairfax County more than doubled, from 210,700 to 438,700 jobs. During this same 15 year period, employment throughout the Washington Metropolitan Region increased by approximately 60 percent, from 1,637,800 jobs in 1980 to 2,633,700 jobs in 1995. Thus, over this period of time, employment growth in Fairfax County represented approximately one-fourth of the total job growth in the entire region.

Between now and 2010, region-wide employment is projected to increase by approximately 30 percent, from 2,636,800 jobs in 1995 to about 3,374,000 jobs in 2010. Over this same time period, employment in Fairfax County is projected to reach a total of approximately 612,900 jobs, about a 40 percent increase over current levels. Much of this projected employment growth is projected to take place in either the western portions of Fairfax County (47 percent in the Bull Run, Pohick, and Upper Potomac Planning Areas) or in the Tysons Corner/Dunn Loring/ Merrifield areas adjacent to the Capital Beltway (27 percent of the total job growth).

These new jobs will attract not only Fairfax County residents but also residents of Loudoun, Prince William and the more westerly counties served by the I-66, U.S. Route 50, and U.S. Route 29 travel corridors. With much of this projected employment growth anticipated to be located either adjacent to the Capital Beltway or along the Dulles Toll Road, Route 28, and I-66 corridors, the likelihood for both a continued dispersion of travel patterns and increased traffic congestion along these major travel routes is obvious. Figures 4 and 5 present the 1990 and 2020 employment growth by TAZ and the 2020 employment by TAZ.

## 4. Air Quality Violations and Non-Attainment for Ozone and CO

As a result of the dramatic increases in population, employment, and travel which have taken place in the Washington Metropolitan Area over the past few decades, the region's air quality has deteriorated. The region is presently designated by the U.S. Environmental Protection Agency (EPA) as a moderate non-attainment area for Ozone and Carbon Dioxide (CO). As such, the 1990 Clean Air Act Amendments (CAAA) required the region to adopt a structured, multi-year approach to achieve federal clean air standards. This included a 1999 deadline for the reduction of ozone to acceptable levels. It is estimated that cars, trucks, and buses are responsible for about one-half of the emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx) responsible for the creation of ozone in the region.




Source: Dulles Corridor Transportation Study; Adapted from MWCOG Cooperative Forecasts, Round 5.2

I-66 Major Investment Study

VINIT BRW

Figure 2

2020/1990 Delta Household per TAZ–
New TAZ System

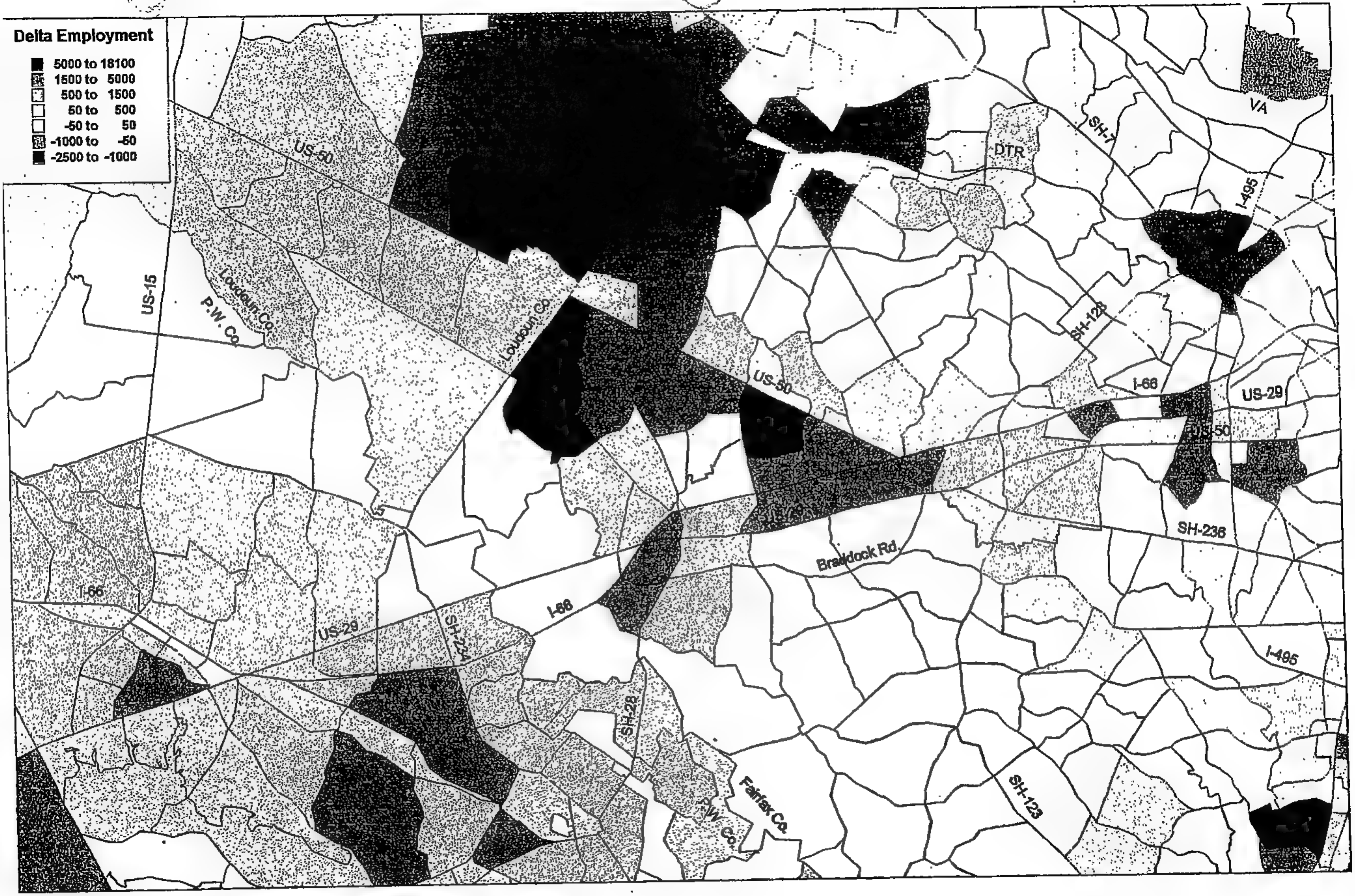

"Source: Dulles Corridor Transportation Study; Adapted from MWCOG Cooperative Forecasts, Round 5.2

I-66 Major Investment Study

VDOT BRW

Figure 3

2020 Households per TAZ– New TAZ System



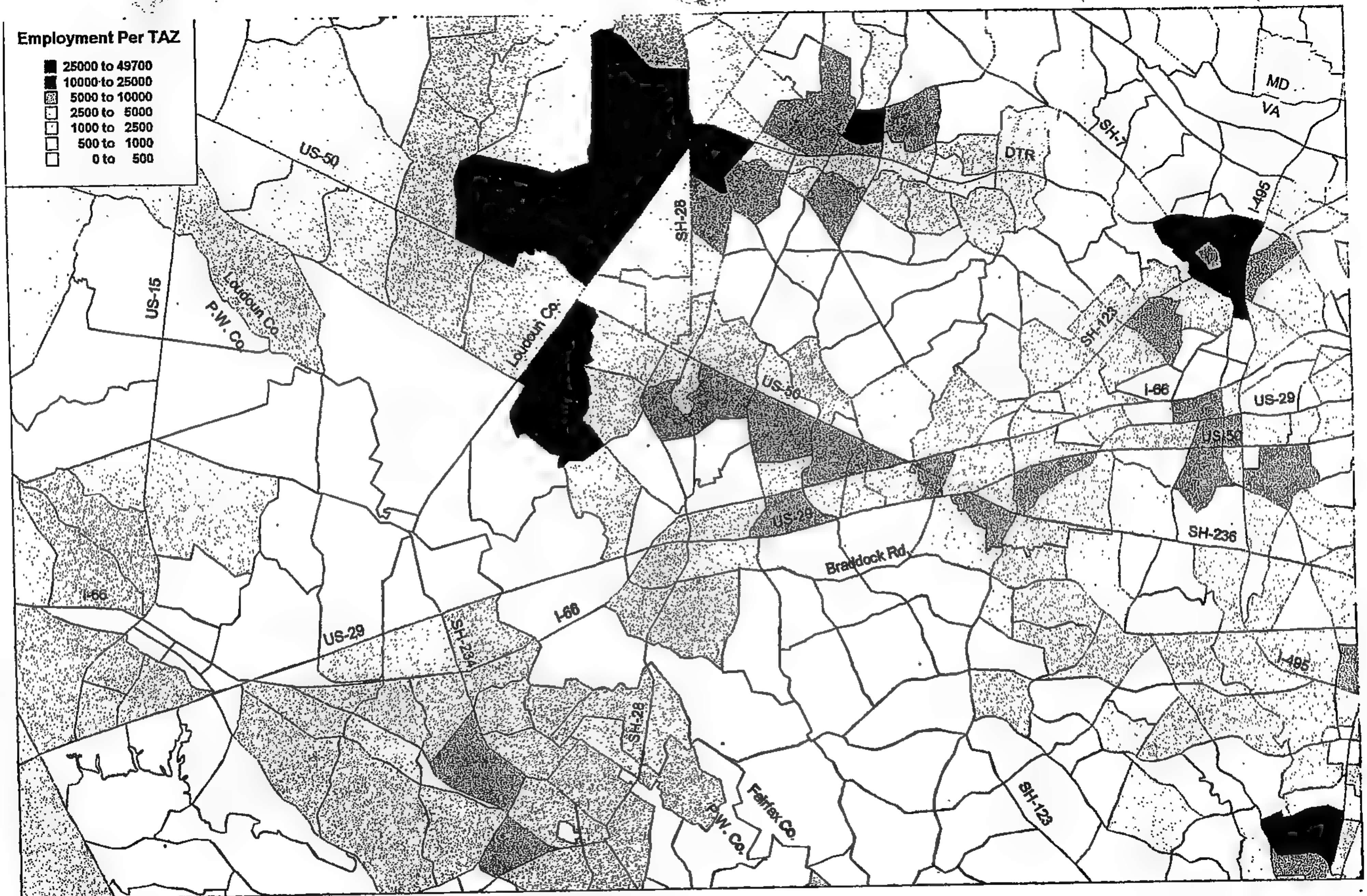

·Source: Dulles Corridor Transportation Study; Adapted from MWCOG Cooperative Forecasts, Round 5.2

I-66 Major Investment Study

BRW

Figure 4

**2020/1990 Delta Employment per TAZ– New TAZ System**




Source: Dulles Corridor Transportation Study; Adapted from MWCOG Cooperative Forecasts, Round 5.2

I-66 Major Investment Study

Figure 5

**2020 Employment per TAZ– New TAZ System**

In order to remain in compliance with CAAA requirements, it is necessary to demonstrate that the regional long-range transportation plan and the associated Transportation Improvement Plan (TIP) are "in conformity"; that is, future air quality must be improved in comparison to those conditions which existed in 1990. The achievement of these goals will be particularly challenging in the face of projected increases in travel in the region over the next 20-25 years, much of which will take place on increasingly congested freeway and arterial highways.

### 5. Lack of Transit Access to Employment Opportunities in Corridor

As noted previously, the I-66 MIS Corridor and its immediate environs are anticipated to experience continuing significant increases in employment over the next 15-20 years. At the same time, the dispersion of many of these new jobs throughout the western portions of the study area will present challenges in ensuring that all residents of the region have access to these new employment opportunities.

In a manner similar to most other suburban communities across the country, the structure of the public transportation system serving the I-66 MIS Corridor has historically developed into a radial orientation designed primarily to transport suburban workers to jobs in the central city, in this case Downtown Washington, D.C. Yet, as determined by U.S. Census data, such trips are becoming an ever smaller percentage of total work trips in this region. In 1990, approximately 163,500 (or about 23 percent) of the 718,600 total home based work trips made by Fairfax County residents were to destinations in the District of Columbia. Conversely, some 363,400 work trips (about 51 percent) had both their origin and their destination in Fairfax County. Projections by the Metropolitan Washington Council of Governments indicate that these percentages will be approximately 18 percent and 57 percent, respectively, of the total of approximately 1,035,200 daily home based work trips forecast to be made in the year 2020.

Moreover, while a reasonably high level of all-day, two-directional transit service is operated in the eastern third of the I-66 MIS Corridor (from the Capital Beltway west to the City of Fairfax), transit service in western Fairfax County, and all of Prince William and Loudoun Counties, is basically limited to peak period, peak direction feeder bus operations linking residential communities to the Metrorail Orange Line stations at Vienna and West Falls Church. Similarly, existing VRE service provides an excellent means for suburban residents to travel to the central core area of the region in peak hours, but offers no such option for reverse commuters; i.e., those persons residing in areas inside the Capital Beltway desiring to travel to suburban employment centers such as Fair Lakes.

Thus, a need of this project is to define the most cost-effective manner in which to ensure that all of the travel patterns in the corridor receive an equitable allocation of public transit services.

### 6. Physical Limitations on Ability to Expand Corridor Infrastructure

Like most of the major metropolitan areas along the east coast of the United States, the Washington Region has experienced continuing growth and development for a period in excess of 200 years, with communities such as Alexandria dating from the early 1700s. As the area of urbanization has expanded dramatically over the past 30-40 years, highways which were once minor country roads have been subjected to dramatic increases in travel demand, with daily

traffic volumes in excess of 20,000 vehicles per day not uncommon on many sections of two-lane roadway.

Complicating the potential resolution of these problems is the fact that much of the development which has taken place over the past few decades has been in areas immediately adjacent to these older "farm to market" roads. With generally limited public rights of way available, the cost of widening and modernizing such facilities to accommodate present day and projected future year traffic demands is very difficult, with land acquisition costs frequently equaling or exceeding the costs of the physical improvements.

Even along those "newer" transportation facilities such as I-66, Arlington Boulevard (U.S. Route 50), Route 28, and the Fairfax County Parkway (Route 7100), substantial development has taken place immediately adjacent to the edge of the public right of way. Thus, any future expansion of these facilities to accommodate continuing traffic demands will likely be limited to those physical improvements which can be undertaken within the existing rights of way.

### 7. Need for Improved Coordination and Management of the Multi-Modal Transportation System in the Corridor

The I-66 MIS Corridor represents one of the most complex corridors in the Washington region in terms of the range of transportation facilities and services which it contains. These include: the I-66 freeway (which includes peak period HOV lanes between the Capital Beltway and Route 50), major arterial streets and highways such as Route 28, Route 29, Route 50, and the Fairfax County Parkway; numerous minor arterial/collector facilities of varying ages, conditions, and capacities; the terminus segments of the Metrorail Orange Line; the Manassas Line of the Virginia Railway Express (VRE) system; and a variety of local and express bus services.

Equally complex is the diverse group of agencies which are responsible for the operation of this multi-modal transportation system. These include: Virginia Department of Rail and Public Transportation, the Virginia Department of Transportation for all public highways, the Washington Metropolitan Area Transit Authority (WMATA) for Metrorail and Metrobus services, Fairfax County for the Fairfax Connector and Fastran bus services, the City of Fairfax and George Mason University for the CUE Bus System, Prince William County and the Potomac - Rappahannock Transportation Commission (PRTC) for the CommuteRide Bus service, and the Northern Virginia Transportation Commission (NVTC) and the PRTC for the VRE commuter rail service. Additional "players" include: the Metropolitan Washington Airports Authority (the owner/operator of the Dulles Airport Access Road), the Virginia Toll Road Corporation (the owner/operator of the Dulles Greenway Toll Road), and several private developers who operate shuttle bus services between their developments and the Vienna, Dunn Loring and/or West Falls Church stations on the Metro Orange Line.

Clearly, there is a need for these "stakeholders" in this MIS process to be involved in the development, evaluation, and, perhaps most importantly, the implementation and operation of the ultimated recommended transportation investment strategy for the corridor.

8. **Corridor Infrastructure Inadequately Serves the Travel Demand Associated with Current and Projected Land Use**

IT APPEARS THAT THIS ITEM DUPLICATES TO A LARGE DEGREE THE DISCUSSION THAT WAS PRESENTED UNDER ITEM #1 AND #2 ABOVE. THIS WILL BE DISCUSSED AT THE TAC MEETING

9. **Identification of Need to Identify Limited Financial Resources to Pay for Needed Transportation Facilities and Services.**

As has been documented in previous studies undertaken for the Metropolitan Washington Council of Governments and the various local jurisdictions, the estimated costs of the presently planned transportation system improvements for the region substantially exceed the estimates of total available funds over the next 20-25 years. Quoting from the Long Range Transportation Plan for the National Capital Region:[1]

> *During the next two decades, the operation and maintenance of the current highway and transit systems will consume about three-quarters of the available transportation revenues for Suburban Maryland and Northern Virginia, and almost all of the District's transportation revenues...Indeed, unless major new funding sources are developed, it must be assumed that most of our future transportation system is in place today.*

Thus, a critical aspect of developing the ability to implement the preferred transportation investment strategy for the I-66 MIS project will be the identification of the manner in which both the capital and annual operating costs associated with the ultimately recommended transportation investment strategy for the corridor can be funded.

10. **Need to Better Manage and Coordinate the Movement of Goods in the Corridor.**

The nature of the economy in the Washington Region is based primarily on government agencies and the service and tourism industries. Thus, goods movement is involved primarily with the transport of retail goods, office supplies and associated equipment rather than the movement of raw materials or manufactured products. The vast majority of this regional goods movement function is provided by trucking, both for primary transportation in and out of the region, as well as for local pick-up and delivery.

It is estimated that trucks represent an average of between 3 and 8 percent of the total traffic stream on most of the major highways in the region, with the notable exception of the I-95/I-495 segments of the Capital Beltway where approximately 12 to 15 percent of the traffic stream is comprised of trucks. The impact of this mixture of trucks in the general traffic stream, especially on the congested freeway and arterial highway system during peak travel periods, is an important consideration. Additionally, some important elements of the study area highway

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1 Long-Range Transportation Plan for the National Capital Region; National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments; Washington, D.C.; September 21, 1994; Page 2-29.

system (such as I-66 inside the Capital Beltway and portions of Route 50 in Fairfax County) are either totally restricted from being used by trucks or are subject to weight restrictions.

As a result, a description of the manner in which to better manage and coordinate the movement of goods in the study corridor will need to be an element of the ultimately recommended transportation investment strategy.

# I-66 Major Investment Study

DRAFT

# Methods Reports

Travel Demand Forecasting
Station Area Planning
Alternatives Evaluation
Cost Estimating
Public/Agency Involvement

September 15, 1995

DRAFT

# METHODOLOGY REPORT

# FOR THE

# TRAVEL DEMAND FORECASTING MODEL SET

for the

## I-66 Major Investment Study

Prepared for the

Commonwealth of Virginia

Department of Rail and Public Transportation

and

Department of Transportation

Prepared by

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## SECTION 1 - INTRODUCTION

The travel demand forecasting component of the I-66 Major Investment Study can be considered in four incremental stages:

- Stage 1: Use the existing Dulles Corridor Transportation Study Model developed by Parsons, Brinckerhoff, Quade, and Douglas (PBQ&D) for initial screening of alternatives,

- Stage 2: Revise the "Dulles Model" to incorporate an expanded cordon and revalidate to a 1995 base,

- Stage 3: Use the revised Dulles Model for "final" alternative runs, and

- Stage 4: Develop multi-modal post-processing/evaluation measures.

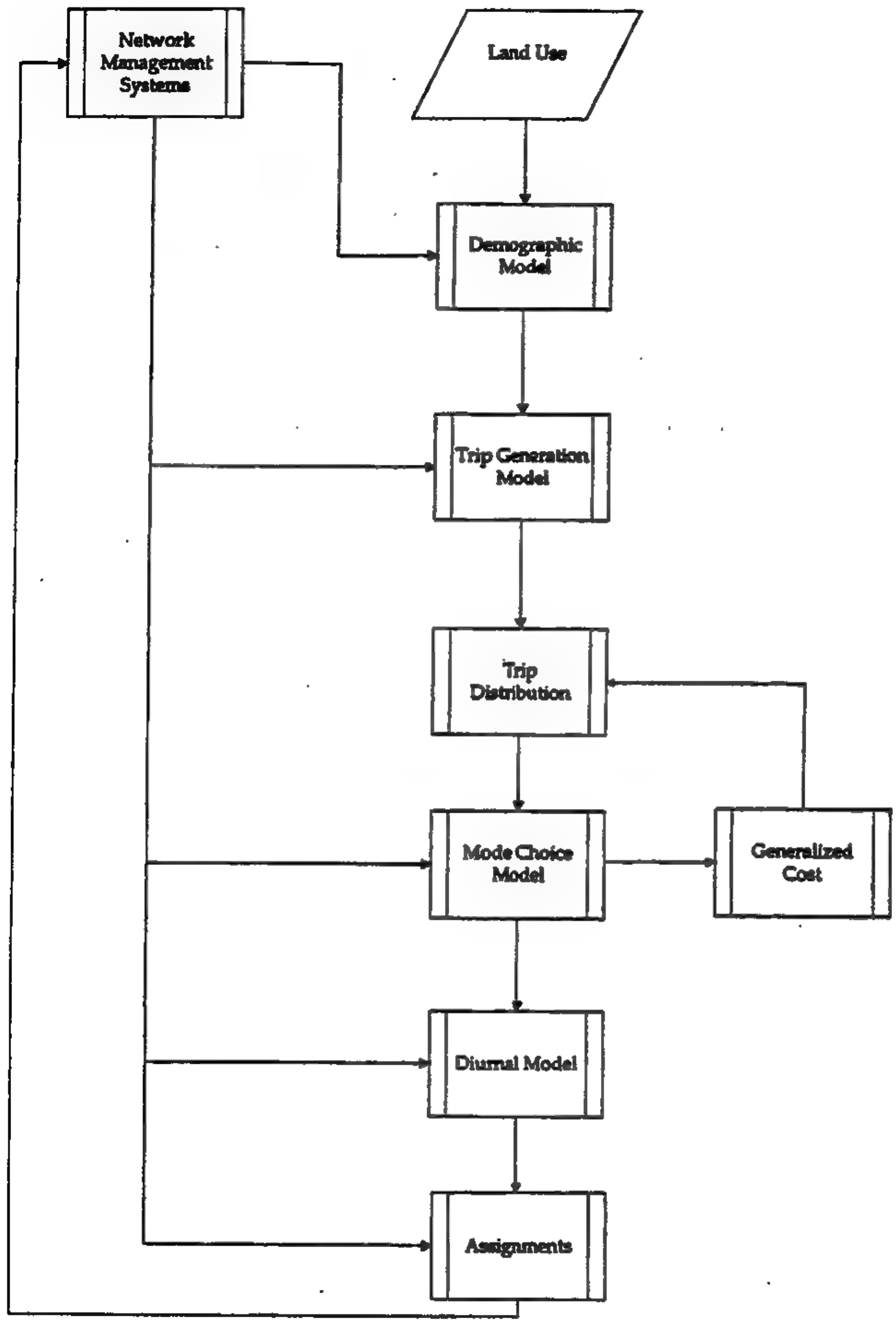
This report summarizes the methodology to be employed to complete these stages. It is a DRAFT working framework from which more detailed procedures will be developed. The first section presents an overview of the existing Dulles Model. A brief discussion of the screening process follows, including elements of the model which will be used to screen initial alternatives. The model expansion/revalidated process is then outlined. Finally, the final alternative runs and potential evaluation criteria are discussed.

## SECTION 2 - OVERVIEW OF EXISTING DULLES CORRIDOR TRANSPORTATION STUDY MODEL

The travel demand forecasting model system developed by PBQ&D for use in the Dulles Corridor Transportation Study is based on the traditional four step process (trip generation, trip distribution, mode choice, assignment) with accessibility enhancement imbedded in each of the steps. In addition, a diurnal procedure to generate time of day specific trip tables is included. Figure 2.1 shows the general model structure. The following discussion briefly outlines the highway network, transit network, trip generation, trip distribution, mode choice, time of day, and assignment procedures. Additional information on each topic can be found in special reports prepared by PBQ&D, which are referred to in each section and are summarized at the end of this document. The Dulles model consists of routines using the MINUTP transportation software package combined with stand-alone programs developed by PBQ&D.

**Figure 2.1**

## GENERAL MODEL STRUCTURE




Source: *Overview of the Travel Demand Models for the Dulles Corridor Rail Study*

**Highway Network/Paths**

The 1990 highway network used in the Dulles Corridor Transportation Study is based on the 1990 MWCOG regional highway network. PBQ&D has refined the highway network coding to include the following features:

- Free flow speeds and capacities are now a function of facility type and area type in lieu of route type and "rings" (from the D.C. core)
- "Micro" coding of freeway and expressways to include directionality and interchange ramps
- A database management system to store highway link attributes such as speeds by time period (Highway Network Management System - HNMS)

HNMS creates highway link and coordinate cards to be used in the MINUTP NETBLD module. A detailed discussion of the highway network and database procedures can be found in *Highway Coding and Assignment Procedures.*

For each highway network built (AM peak and daily), six sets of paths are built and summarized in skim files:

- Single Occupant Vehicle (SOV) (No Toll)
- SOV (Toll)
- High Occupancy Vehicle 2 persons/vehicle (HOV 2) (No Toll)
- HOV 2 (Toll)
- HOV 3+ (No Toll)
- HOV 3+ (Toll)

The skims are used in modal choice and generated using MINUTP's PTHBLD module.

**Transit Network/Paths**

The 1990 transit network used in the Dulles Corridor Transportation Study is loosely based on the 1990 MWCOG regional transit network. PBQ&D has refined network coding assumptions to reflect the multiple transit operators with the following modal distinctions:

- Metro local bus (Mode 1)
- Metro express bus (Mode 2)
- Metro rail service (Mode 3)
- Commuter rail (Mode 4)
- Other rail (heavy or light) (Mode 5)
- Other local bus (Mode 6)
- Other express bus (Mode 7)
- Other local bus (secondary) (Mode 8)
- Other express bus (secondary) (Mode 9)

PBQ&D created the Transit Network Manager (TNM) to maintain different route and link attributes. TNM creates transit link and route cards to be used in the MINUTP TRNPTH module. TRNPTH is an integrated network processor which uses highway links and speeds as a basis in building the transit network.

PBQ&D has written several access programs to generate walk and drive access links to transit routes. Inputs to these procedures include a highway network, a zonal percent walk file, and a station data file. These programs minimize coding times and potential errors in access assumptions.

For each transit network (AM peak and off-peak), five sets of paths are built and summarized in skim files:

- Walk to local transit
- Walk to premium transit
- Drive to local transit
- Drive accessibility
- Walk accessibility

The last two sets of skims are used for trip generation accessibility while the first three are used in modal choice. The files are generated using MINUTP's TRNPTH module. A detailed discussion of the transit network, database procedures, access, and path building can be found in a *Transit Network for the Dulles Corridor Transportation Study.*

**Trip Generation**

Trip generation is defined as the determination of zonal productions and attractions by purpose. The Dulles model has seven trip purposes:

- Home-Based Work (HBW)
- Home-Based University (HBU)
- Home-Based Shopping (HBS)
- Home-Based Other (HBO)
- Non-Home-Based Journey to Work (NHBJTW)
- Non-Home-Based at Work (NHBWRK)
- Non-Home-Based Non-Work (NHBNWK)

The Non-Home-Based category was divided three ways to better portray trip chaining. Non-motorized (i.e., walk and bicycle) trips are also modeled. Households are stratified by persons, workers, and available vehicles.

PBQ&D has created a program to simulate trip making. Inputs to the program include the MWCOG land use activity file, Anne Arundel County and Howard County data, and additional zonal data (e.g., university enrollment, area type, income ratios, etc.). There are two "stages" to the trip generation program. In Stage 1 household size, workers, and available vehicles are calculated. The second stage uses the output of Stage 1 and the accessibility skims to compute zonal productions and attractions by purpose which are output in MINUTP TRPGEN format.

A detailed discussion of trip generation can be found in two documents: *Calibration of the Trip Generation Procedures of the Travel Demand Model Set for the Dulles Corridor Transportation Study* and *User's Guide to the Trip Generation Procedure of the Travel Demand Model Set for the Dulles Corridor Transportation Study.*

**Trip Distribution**

The trip distribution model used in the Dulles Corridor Transportation Study is a series of standard gravity models. A generalized cost measure, stratified by vehicle availability for the home-based trip purposes, computed by the mode choice model, is used as the input zone to zone measure. The composite

impedance incorporates travel time and cost for all modes (auto, transit, taxi, bicycle, and walk). The trip distribution process is still undergoing final calibration and documentation at PBQ&D.

### Modal Choice

The modal choice model used in the Dulles Corridor Transportation Study is a nested logit model. Figure 2.2 shows the structure of the model. Highway, transit, taxi, and non-motorized modes comprise the top nest of the model. Walk and bicycle sub-modes are a nest under the non-motorized mode. The highway mode nests further into drive alone and group sub-modes. The group sub-mode nests further into 2 and 3+ persons/vehicle. The final nest for all highway sub-modes is toll roads versus "free" roads. The primary sub-modes for the transit nest are local bus, express bus, commuter rail, and Metrorail. Each transit sub-mode has two further sub-modes to specify mode of arrival and station choice, respectively. The available (sub)modes of arrival are: walk, feeder bus, park-and-ride, and kiss-and-ride. The station choice sub-model identifies the four "best" stations for all modes of arrival except walk.

PBQ&D has written a program to apply the model for all purposes. Various inputs in ASCII and MINUTP binary format are required, including parking costs, walk percentages, walk times, station data, impedances for all modes, and fares for transit and taxi modes. A detailed discussion of the modal choice model can be found in *User's Guide to the Mode Choice Procedure of the Travel Demand Model Set for the Dulles Corridor Transportation Study.*

### Time of Day

The above steps (Trip Generation, Trip Distribution, and Modal Choice) are simulated using 24 hour average weekday trips. The only periodic distinction is the use of AM peak impedances to model work trips and the off-peak impedance for non-work trips. PBQ&D has developed models to subdivide post-mode split trip table into 30 minute time periods and ultimately a peak hour (considered to be 7:30-8:30 AM) using starting time, ending time, or time in motion. The time period program can create trip tables for any mode but the peak hour program is specific to the auto mode. A detailed discussion of the diurnal model can be found in *User's Guide to the Time of Day Modeling Procedures of the Travel Demand Model Set for the Dulles Corridor Transportation Study.*

### Highway Assignment

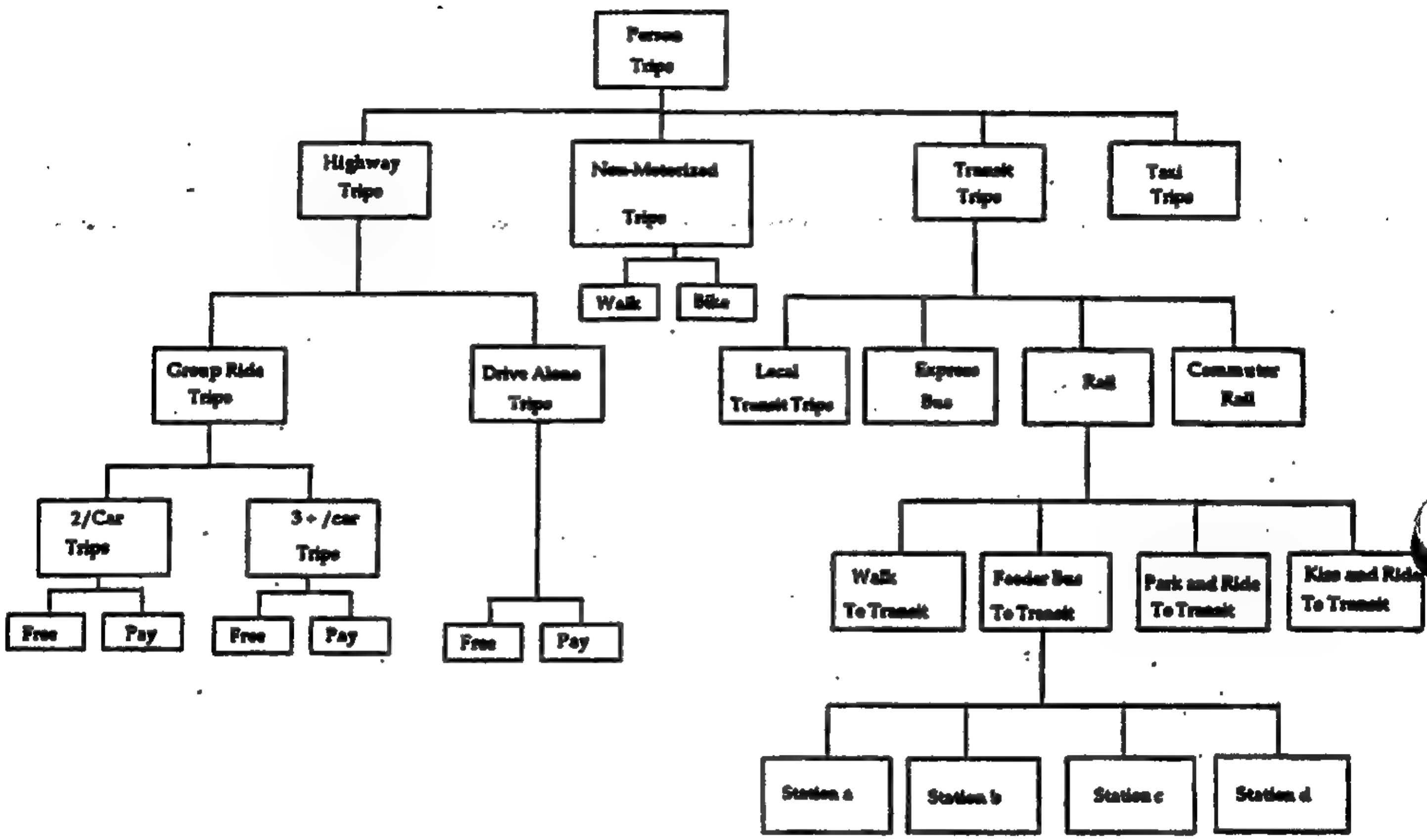
Highway assignment can be considered the "loading" of trips onto a highway network of links with various capacities and impedances. Using the trip tables developed during the time of day process assignments are performed for the AM Peak, PM Peak, and Off-Peak periods. An assignment is also performed for the Peak Hour (7:30-8:30) period. The volume/capacity relationships in the algorithm have been calibrated to replicate conditions in the Washington, D.C. area. A detailed discussion of the highway assignment process can be found in *Overview of the Travel Demand Models for the Dulles Corridor Transportation Study: Appendix B: Volume Delay Functions for Traffic Assignment.*

### Transit Assignment

At the time of writing, the transit assignment procedures are still under development by PBQ&D.

**Figure 2.2**

**Mode Choice Model Structure**




Source: *Parsons, Brinkerhoff, Quade, and Douglas*

## SECTION 3 - SCREENING ALTERNATIVES

A total of 15 alternatives plus a no-build base have been identified for "Tier 1" screening analysis. These alternatives are designed to explore the potential of each of the many modes that can be considered to improve transportation service in the I-66 corridor. The alternatives include the following:

- 1 - "No Build"/Base Case
- 2 - TDM/TSM/ITS/Transit Improvements
- 3A - I-66 HOV Facilities Enhancement
- 3B - Extend HOV Lanes Beyond Gainesville
- 3C - Create Barrier Separated HOV Facility Along I-66
- 4A - I-66 Roadway Improvements
- 4B - Upgrade Routes 29 and 50 to "Super Arterials"
- 4C - Maximum Roadway System Improvement (Combination of 4A/4B)
- 5A - Extend VRE Service to Nokesville Area
- 5B - Extend VRE Service to Gainesville & Haymarket
- 5C - Extend VRE Service to Gainesville/Haymarket and Nokesville Area
- 6A - Basic Rail Transit to Dulles International Airport (IAD)
- 6B - Basic Rail Transit to Centreville/Manassas
- 6C - Basic Rail Transit to Both IAD and Centreville/Manassas
- 7A - Metro-like Rail Extension to Centreville (All in I-66 Median)
- 7B - Metro-like Rail Extension to Dulles International Airport (IAD) Via Route 50

In order to estimate patronage impacts in a timely and cost-effective manner, several of these alternatives will be simulated using major portions of the new travel demand model system developed for the Dulles project. Eight of these alternatives will be simulated, providing enough information to infer the performance of the remaining options. The options that have been identified for Tier 1 travel demand simulation include:

- 1 - "No Build"/Base Case
- 3A - I-66 HOV Facilities Enhancement
- 4A - I-66 Roadway Improvements
- 4B - Upgrade Routes 29 and 50 to "Super Arterials"
- 5C - Extend VRE Service to Gainesville/Haymarket and Nokesville Area
- 6A - Basic Rail Transit to Dulles International Airport (IAD)
- 6B - Basic Rail Transit to Centreville/Manassas
- 7A - Metro-like Rail Extension to Centreville (All in I-66 Median)

A complete simulation using the existing Dulles Model of the No Build alternative will be made and the person trip tables produced by this simulation will be preserved. These trip tables will then be used to perform peak period network analysis, work trip modal choice, and peak assignments. Non-work trip and off-peak analysis may be performed if the project schedule permits. The results of the No Build alternative will be used to develop factors to expand certain elements of the work trip analysis for the other alternatives to total daily values as required. Speed feedback and composite impedance procedures will also not be performed on an alternative specific basis. Alternative evaluation measures will be more abbreviated than in the final refined analysis.

## SECTION 4 - MODEL REFINEMENTS

### Cordon Expansion

The Dulles Model currently uses the MWCOG 1478-zone system, which covers all of Prince William County and the urbanized eastern portion of Loudoun County (refer to Figure 4.1). MWCOG has recently expanded its cordon to 2191 zones, covering all of Prince William, Loudoun, Clarke, and Fauquier Counties, among other areas. In addition, the previous zones in Fairfax, Loudoun, and Prince William Counties have been subdivided to create a finer, more detailed network and zone system (refer to Figure 4.2). It is anticipated that the main value of the cordon expansion is the development of improved vehicle trip assignments on those highway links in those areas at the western edge of the old cordon, such as Haymarket, Middleburg, New Baltimore, and Nokesville. In addition, the cordon expansion should enhance the modeling accuracy for VRE and the Prince William CommuterRide services, since more of their service areas will now be completely within the modeled area. Finally, the greater zone detail will improve accuracy for both highway and transit assignments throughout most of the region. The expanded cordon zone system is described in more detail in the MWCOG report *Network Documentation: 1990 Expanded-Cordon Highway Network.*

Although the I-66 MIS primary study area does not extend beyond the old cordon, it was judged necessary to use the expanded cordon model for the analysis of the final alternatives, for enhanced accuracy within the study area, as stated above. This also helps to maintain consistency with the Western Bypass study, which is being conducted at the same time, is covering some of the same study area, and which will also use the Dulles Model and the expanded cordon system.

MWCOG and its member jurisdictions have recently modified the regional land use files to reflect the new zone system and the cordon expansion (except for Prince George's County, which has not yet developed land use data for its new zones). MWCOG and the Western Bypass consulting team are expanding the highway and transit networks to reflect the new zone system and the cordon expansion. Finally, MWCOG is developing Truck, Through, and Miscellaneous daily vehicle trip tables to reflect the new zone system and expanded cordon. This project will coordinate with MWCOG and the Western Bypass consulting team to obtain these updated input files.

### Round 5.2 Land Use

The Dulles Model was developed using the then-most recent version of the MWCOG land use allocation file: Round 5.1. This file has subsequently been updated to Round 5.2, which includes new forecasts for 2015 and 2020. Round 5.2 is the first version of the MWCOG land use file that reflects the expanded cordon system. Thus, the Round 5.2 file should be used for all subsequent model applications.

**Figure 4.1**

**Current MWCOG Zone System**

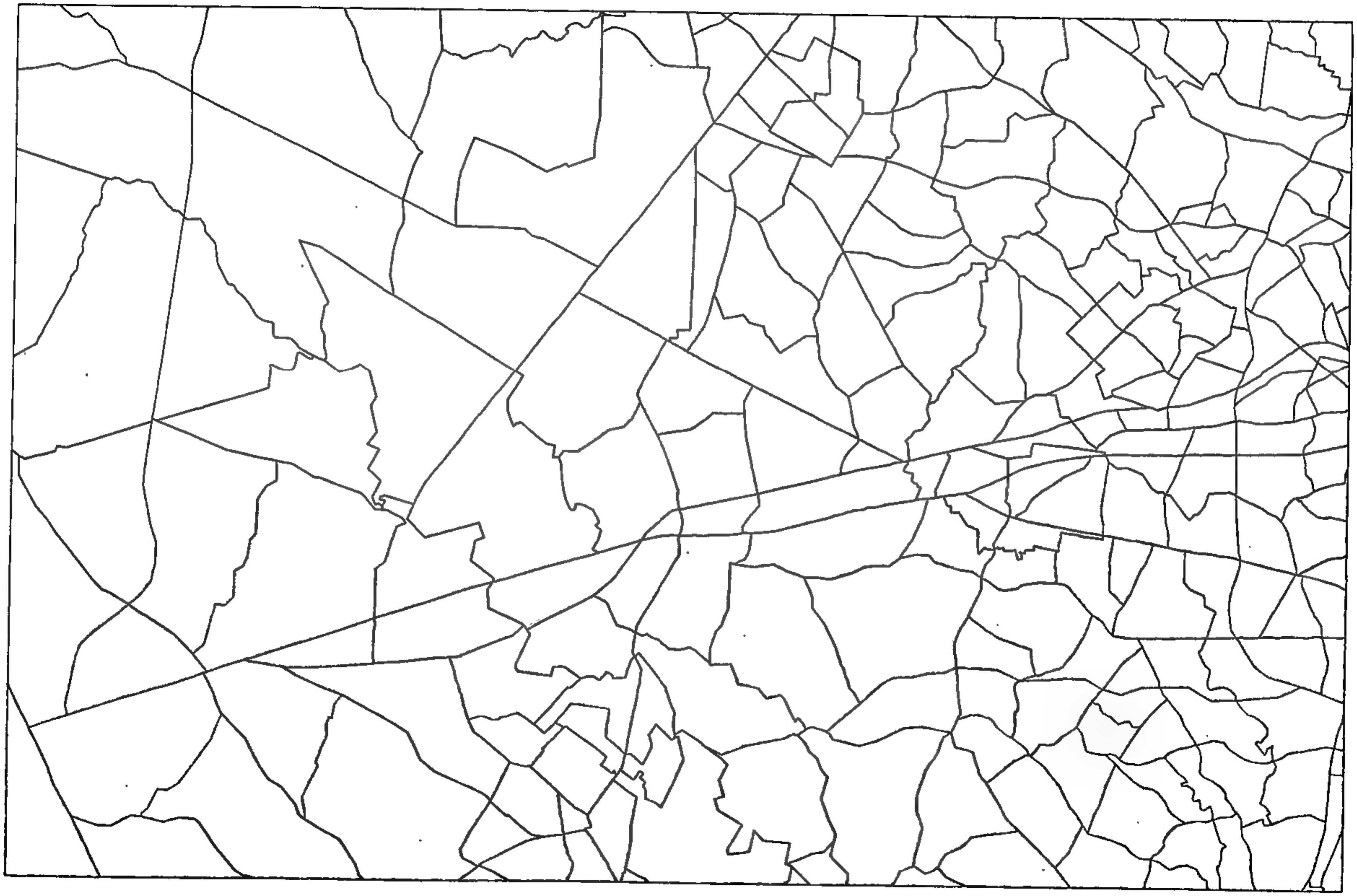
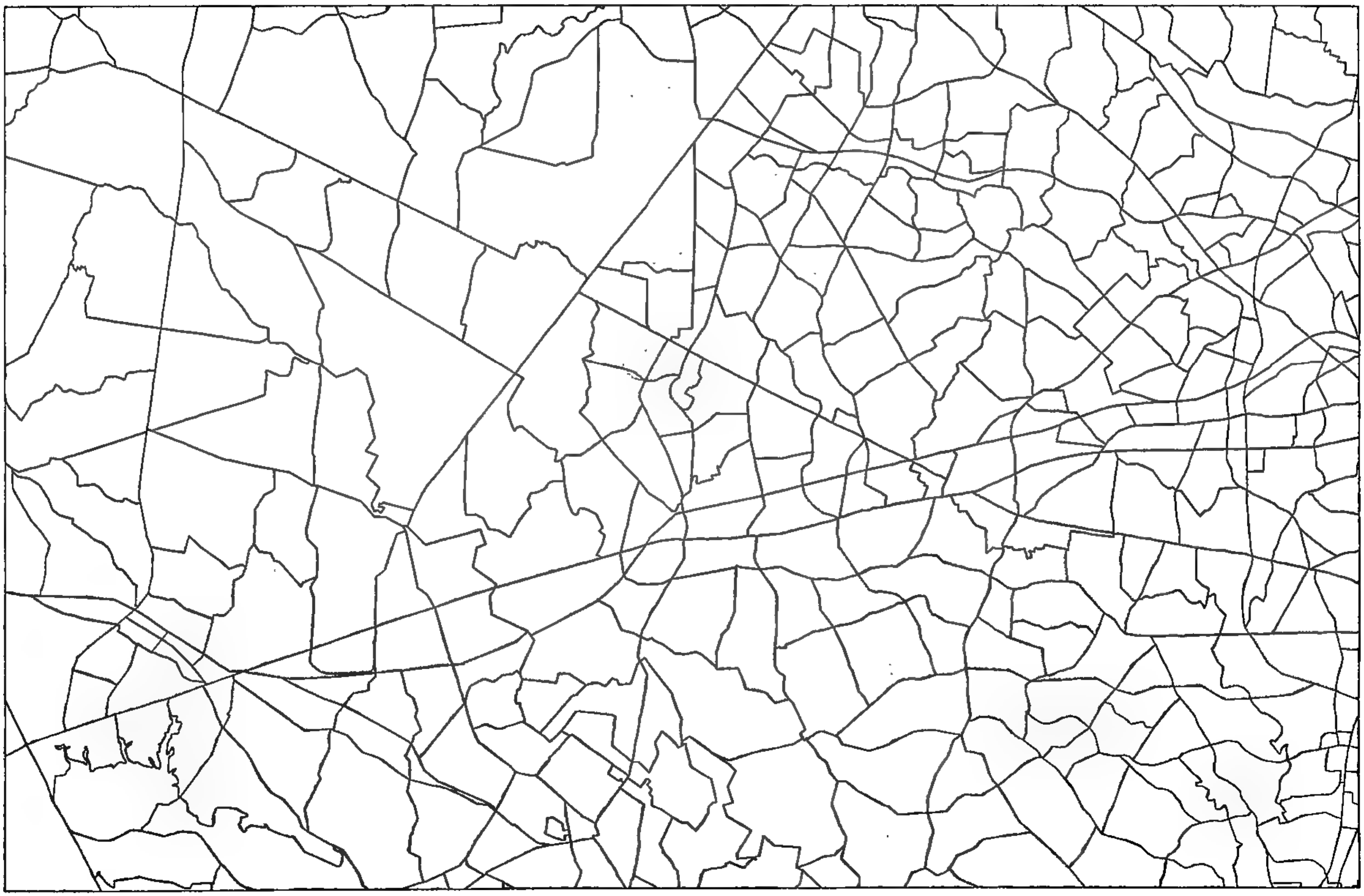


**Figure 4.2**

**Expanded MWCOG Zone System**



**1995 Revalidation**

The Dulles Model was calibrated to a 1990 base year using 1987-88 home interview survey data, as well as Census data and transit ridership data from 1990. Since it is now five years later, it was judged appropriate to re-validate the model to 1995 conditions, especially given the recent development of the new zone system and expanded cordon. Land use for 1995 is available from MWCOG. Highway and transit networks for 1990 are presently being created by MWCOG and the Western Bypass consulting team. The I-66 study will obtain those networks and update them to represent conditions as of July, 1995 (with particular emphasis on the I-66 study area). The study's Technical Advisory Committee will be consulted concerning the list of highway and transit system changes between 1990 and 1995. The 2020 No-Build networks used in the Dulles Corridor Rail Study will also be referenced for this task.

The Consultant will work with VDOT and the local transit operators to obtain daily traffic counts and transit ridership data by line for the study area. If summer, 1995 data are unavailable, the most recent available data will be used and adjusted as appropriate to represent 1995 conditions. On-going work on the I-66 Congestion Management Program being performed for VDOT will also be reviewed for observed travel data. MWCOG is presently checking and geocoding its 1993-94 Home Interview Survey. If that data becomes available on a timely basis, the Consultant will review it as well as a potential source of current observed data.

The full Dulles Model set will be applied to the 1995 land use and networks representing the expanded cordon zone system. The model outputs will be carefully reviewed, especially within the study area. This will include link vehicle volumes, average vehicle occupancies, and transit riders. The estimated daily travel volumes will be compared with the observed data in the study area in a number of ways, for example: traffic volume by screenline and link group, VMT by facility type and/or area type, boardings by Metrorail and VRE station, and total boardings or maximum load point volumes on major bus lines (or line groups). In addition, certain region wide checks will be made (VMT, transit ridership) and 1995 travel volumes will be compared with 1990 volumes regionwide.

The Consultant will establish accuracy criteria by which to judge how well the model is performing for 1995. This will consider the accuracy of previous MWCOG traffic and transit forecasts within the area, the results of the Dulles Corridor Rail Study 1990 validation, and other accepted standards of model accuracy. Based on these criteria, the Consultant will issue a Technical Memorandum documenting the results of the 1995 model application and the comparison to observed data. If this analysis indicates the potential need for model adjustments, the Consultant will identify such adjustments and review these with the Technical Advisory Committee before implementing such adjustments. Coordination with the Western Bypass study TAC is also advised to ensure consistency between the two projects' forecasts.

**Other Enhancements**

*Split Zones*

In addition to the above modifications, the Consultant will also consider subdividing zones in the study area. Greater zone detail can sometimes improve the accuracy of forecasts in the vicinity of rail stations. Although the new MWCOG zone system includes smaller zones in the study area, it may be productive and beneficial to further split the zones. This would require:

- modifying the zone boundary file (which affects mapping, the percent walk calculation, and the accessibility calculation)
- allocating land use to the zone subdivisions (based either on aerial photos or local knowledge)
- modifying the network to add links and/or adjust centroid connectors

- modifying the zonal data file (mean income, zonal area, etc.)

Splitting zones affects every aspect of the model and will complicate the application of the model. Thus, it should not be done unless the benefits clearly outweigh the additional effort.

*External Transit Modelling*

The Dulles Model does not include regional External (I/X or X/I) trips. Although the Trip Production model does estimate all trip productions, the I/X productions are explicitly separated out and discarded. The remainder of the model operates only on I/I zone movements. External and X/X trips are added exogenously (via vehicle trip tables provided by MWCOG) after mode choice and prior to assignment. The Consultant will investigate the potential for adding an External transit modelling capability to this procedure. If this can be done with reasonable accuracy, sensitivity, and allocation of project resources, a method will be proposed and reviewed with the Technical Advisory Committee prior to implementation.

One method of doing this could be to use a post-mode choice MATRIX step which examines the mode shares for the interior zone that lies nearest each external station. Upon further examination of the External vehicle trips at that station, an estimate of transit trips could be developed that would be sensitive to improvements in transit service. This is similar to a procedure used in the 1991 Addison Road Alternatives Analysis study.

## SECTION 5 - FORECASTING AND EVALUATION

The results of the screening analysis, related evaluation criteria, and "fatal flaw" analysis will yield a revised set of ten alternatives. It is expected that these alternatives will be multimodal in nature and many will contain elements of two or more of the initial alternatives described above. Each of the alternatives will be analyzed with either the current Dulles Model or the refined, expanded model depending upon timing and availability of the latter. The analysis of these alternatives will include calculations of a more refined set of evaluation measures than those used in the initial screening.

Upon review of the results of this second screening, six final alternatives will be identified. These alternatives will probably include further combinations of the prior alternatives as well as other refinements. These alternatives will be analyzed using the full, refined model system.

Once the forecasts have been completed, an in-depth evaluation process will occur which will require outputs from the forecasting process as inputs. These measures include:

- Gains in HOV and Transit Market Share
- Travel Time Savings
- VMT Impacts
- Providing acceptable levels of service
- Maximizing transit accessibility
- Maximizing person trip capacity

These measures and others will assist in selecting the locally preferred alternative.

## Reference List

Parsons, Brinckerhoff, Quade, and Douglas. March 28, 1995. *Overview of the Travel Demand Models for the Dulles Corridor Transportation Study*. Draft. Virginia Department of Rail and Public Transportation, Dulles Corridor Transportation Study

Parsons, Brinckerhoff, Quade, and Douglas. March 30, 1995. *Highway Coding and Assignment Procedures.* Draft. Virginia Department of Rail and Public Transportation, Dulles Corridor Transportation Study

Parsons, Brinckerhoff, Quade, and Douglas. March 28, 1995. *Transit Network for the Dulles Corridor Transportation Study*. Draft. Virginia Department of Rail and Public Transportation, Dulles Corridor Transportation Study

Parsons, Brinckerhoff, Quade, and Douglas. March 28, 1995. *Calibration of the Trip Generation Procedures of the Travel Demand Model Set for the Dulles Corridor Transportation Study*. Draft. Virginia Department of Rail and Public Transportation, Dulles Corridor Transportation Study

Parsons, Brinckerhoff, Quade, and Douglas. March 28, 1995. *User's Guide to the Trip Generation Procedures of the Travel Demand Model Set for the Dulles Corridor Transportation Study.* Draft. Virginia Department of Rail and Public Transportation, Dulles Corridor Transportation Study

Parsons, Brinckerhoff, Quade, and Douglas. March 28, 1995. *User's Guide to the Modal Choice Procedure of the Travel Demand Model Set for the Dulles Corridor Transportation Study*. Draft. Virginia Department of Rail and Public Transportation, Dulles Corridor Transportation Study

Parsons, Brinckerhoff, Quade, and Douglas. March 26, 1995. *User's Guide to the Time of Day Modelling Procedures of the Travel Demand Model Set for the Dulles Corridor Transportation Study.* Draft. Virginia Department of Rail and Public Transportation, Dulles Corridor Transportation Study

Metropolitan Washington Council of Governments, *Network Documentation: 1990 Expanded-Cordon Highway Network*. Draft. June 30, 1994 (expected to be finalized in mid-September 1995).

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# STATION AREA PLANNING METHODOLOGY REPORT

for the

**I-66 Major Investment Study**

Prepared for the

Commonwealth of Virginia

Department of Rail and Public Transportation

and

Department of Transportation

Prepared by

BRW, Inc.

August 30, 1995

# STATION AREA PLANNING METHODOLOGY

The Washington Metropolitan Area Transit Authority (WMATA) has had exemplary success in accomplishing enviable station area land use density, mixed use and supportive intermodal facilities through the use of joint development on the Metrorail system. This success has been equally experienced in many suburban as well as CBD station areas. Ironically, this was accomplished in spite of the absence of land use impact concerns during the initial planning for the Metrorail system. Since that time the Office of Planning and Development has been very involved in identifying opportunities for public/ private cooperation in building intense, integrated station areas. WMATA is often cited as the best example of successful use of joint development in the United States.

The benefits of this successful application of joint development to the station areas on the Metrorail system have been to :

- Reinforce regional growth management and urban form goals
- Encourage greater transit use
- Create more successful station environments.

Evaluation of the alternatives for the I-66 project will require consideration of land use impacts of new stations to serve Metro-like rail extensions as well as basic rail and commuter rail alternatives. The degree to which stations serving any of these alternatives affect land use will depend on several factors including station location, station spacing, market conditions, and public policy support for land intensification and joint development. Based on the belief that early consideration of these factors will result in even more successful station areas, the alternatives evaluation methodology will include consideration of the likelihood of candidate station locations to result in transit supportive land uses in the areas surrounding the stations.

In the course of conducting subtasks .1 and .2 of the station area planning work program, the following considerations will be made in candidate station locations:

- Existing surrounding uses which might be infilled or redeveloped
- Adequate site size for ancillary station uses
- Ownership patterns which lend themselves to land assembly
- Favorable local market conditions
- Absence of adverse site conditions (excessive slope, offensive adjacent uses, etc.)
- Absence of barriers to connections to other surrounding uses.
- Local government or neighborhood support for land use intensification

The objective is to create the conditions which will make joint development effective and maximize the potential for transit supportive development.

The I-66 corridor has experienced significant residential,commercial, and office development in recent years. Major activity centers in Fairfax County alone include: Virginia Center, Fair Oaks Regional Mall, Fair Lakes, The Westfields Corporate Center, Centreville, Fair Oaks Hospital, George Mason University, etc. Development activity continues in Prince William and Fairfax Counties. Planning for rail services will include consideration of appropriate locations for stations. These stations will be located to serve both existing as well as potential development centers.

Too often rail stations are surrounded by large parking lots, separating the transit service from any adjacent activity centers and neighborhoods. Station area planning on the I-66 corridor project should include site selection, site planning, and development master planning in the area within walking distance of the stations which results in compact, pedestrian-friendly development patterns.

The FTA paper entitled, "Revised Measures for Assessing Major Investments," dated September 1994, places importance on the adoption of transit supportive land use plans by local municipalities. Projects which demonstrate that the corridor currently has population and employment to support high capacity transit and have taken steps to assure that the corridor will develop in patterns conducive to transit use will be given higher rating for funding. "Infill, redevelopment, and new development sites along the corridor should have been identified and planned with attention to their relationship to the transit project. The emphasis should be on transit supportive land uses, densities, and design."

The BRW Team approach to station area planning for the fixed-guideway alternatives on the I-66 project will locate, plan and design station areas to address these FTA concerns. The process will strive to:

- Organize regional growth to be compact and transit supportive.
- Encourage infill and intensification at existing activity centers along the corridor.
- Encourage redevelopment at higher densities along the corridor in existing neighborhoods.
- Preserve sensitive habitat and cultural resources.
- Place commercial, housing, jobs, parks, and civic uses within walking distance of the stations.
- Mix uses near stations.
- Develop transit stations as a central place in the districts they serve, and a focus of public activity.
- Create an environment which supports pedestrian circulation.
- Design stations to enhance intermodal connections.
- Help create a sense of stewardship in the station area by involving the public in the planning and design process.
- Balance the parking/access needs with the development potential.

This is a complex and potentially controversial project which will require comprehensive involvement from a wide variety of interested parties. Perhaps those most affected by the project will be those who live and work in the corridor and in particular in the rail station areas. The BRW Team understands the need for and methods for achieving effective input and support by these parties.

Our approach for effective community involvement in station area planning includes conducting effective workshops where the following types of questions are addressed:

- Where should stations be located?
- What will each station look like?
- How will concerns of property owners, business operators and residents be addressed?
- Should the land uses around each station be changed, how?
- How would auto and bus traffic near each station be controlled to minimize adverse impacts?
- How can other adverse impacts be mitigated?

- What characteristics in each station area should be preserved?
- How will station construction and operation impact existing business?
- How can the stations be designed to be a positive addition in each location?

Previously station area planning for rail projects concentrated on evaluating the economic development which would be attracted to station sites. Recently, the FTA has stated that the experience of new start cities has been mixed in this regard, and that their primary concern is now on how the development which does occur, as a result of improved transit service, is directed in patterns which are conducive to transit use. The BRW Team will conduct a station area planning process which creates commitment to these ideals in the local communities within the corridor.

## CANDIDATE TRANSIT MODES

The following three transit modes will be analyzed.

- Metro-like Service

- Base Rail

- Commuter Rail

## Task Description Overview:

The I-66 corridor has experienced significant residential, commercial, and office development in typical suburban auto oriented patterns. Extension of the Metrorail system should result in new stations which by their location, planning and resultant development and infill redevelopment are transit supportive. This task will assess existing economic and physical conditions in the corridor, select station sites which serve existing as well as future development, and create planning frameworks within which compact pedestrian friendly development can evolve.

**Subtasks:**

00.1 Assessment of Conditions and Needs

- Collect/analyze social, economic and physical data
- Review plans and documents prepared and in-process by others
- Assess new rail station role in reinforcing or reshaping development patterns
- Understand the concerns and needs of surrounding businesses, residents, and visitors
- Formulate goals and objectives

00.2 Preliminary Station Site Selection

- Establish Criteria for site selection
- Evaluate alternative station location issues and forces
- Identify potential development/redevelopment opportunities
- Review preliminary station prototypes for fit assessment
- Select preliminary sites

00.3 Conceptual Site Planning

- Layout sites to address all functional needs
- Use prototypes to identify intermodal impacts
- Modify prototypes to mitigate site specific conditions
- Develop alternative site planning concepts
- Select preferred site plans for each site

00.4 Station Area Plan Development

- Prepare land use plans for development or intensification
- Preserve sensitive habitat and cultural resources
- Identify methods to link the station to surrounding uses
- Develop transit related public spaces as focus of activity
- Place highest density uses within walking distance

00.5 Implementation Strategy Detailing

- Create guidelines to direct building height, bulk, scale
- Frame other urban design controls to accomplish intentions

- Outline needs for public support
- Direct future site planning in standards

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# ALTERNATIVES EVALUATION METHODOLOGY REPORT

for the

## I-66 MAJOR INVESTMENT STUDY

prepared for the

Commonwealth of Virginia

Department of Rail and Public Transportation

and

Department of Transportation

Prepared by

BRW, Inc.

September 5, 1995

# SECTION 1 - INTRODUCTION

Guidelines provided in the past by the Federal Transit Administration (FTA) for preparation of an Alternatives Analysis required submittal of a description of the methods proposed to be used to evaluate the alternatives under consideration. Although current guidelines for federal Major Investment Studies no longer require submittal of the document, its preparation continues to be a valuable step in the alternatives screening and evaluation process.

The Evaluation Methodology Report outlines the applicable goals of the project, lists the evaluation criteria that will be used in the analysis and then describes how the performance of the alternatives will be measured. The report also identifies areas in which the alternatives have similar impacts and areas in which significant differences between alternatives cause different types or levels of impacts.

## 1.1 PROJECT DESCRIPTION

The Virginia Department of Transportation (VDOT) and the Virginia Department of Rail and Public Transportation (VDRPT), in cooperation with the FTA, are evaluating alternatives for improving transportation services in the Interstate 66 (I-66) Corridor between Interstate 495 (I-495) Capital Beltway and Route 15 in Fairfax and Prince William Counties, Virginia.

## 1.2 DESCRIPTION OF ALTERNATIVES

The I-66 MIS study will develop for evaluation up to fifteen (15) multi-modal alternatives, including No Build, for the base year 2020. As part of the MIS, various technologies as well as alignments will be evaluated. Therefore in the development of the initial set of alternatives, or Universe of Alternatives, more than one alternative per mode has been developed. These alternatives will include the following modes or improvements:

- TSM/TDM/ITS/Transit Improvements
- I-66 HOV Improvements
- Roadway Improvements
- VRE Commuter Rail Improvements
- Basic Rail Transit
- Metro-like Rail Service

Each alternative is described in detail in the Universe of Conceptual Alternatives Report.

## 1.3 PURPOSE OF REPORT

The evaluation of the I-66 Corridor alternatives will be based on the goals and objectives established for this study. Each of the goals and objectives will be associated with a set of evaluation criteria. Each evaluation criteria is supported by an analysis of specific factors.

This report describes the analyses which will be conducted to support the evaluation of alternatives, as

well as the relationship of the analyses to the evaluation criteria and the project goal and objectives. The identification of the evaluation process at an early point in the development of the project allows decision-makers and other project participants the opportunity to confirm that the appropriate goals, evaluation criteria and analyses are being used in the evaluation process.

# SECTION 2 - EVALUATION FRAMEWORK

The evaluation framework of the I-66 MIS alternatives will be based upon community input, the Purpose and Need Statement developed for the study, and input from the Technical Advisory Committee. An overview of the evaluation process is illustrated on the following graphic.

Recent FTA guidelines will be reflected in the measures used to assess the performance of the alternatives in addressing the projects purpose and need.

## 2.1 PURPOSE AND NEED

The evaluation of alternatives examined in the study will focus on the degree to which each satisfies or addresses the problems and issues identified in the Purpose and Need Statement for this study. These problems or needs have been developed into goals for the I-66 MIS study.

Project Goals

Within the development of this project, the I-66 MIS Study, corridor specific goals were developed based on the issues identified in the Draft Purpose and Need Statement for the project. These goals are:

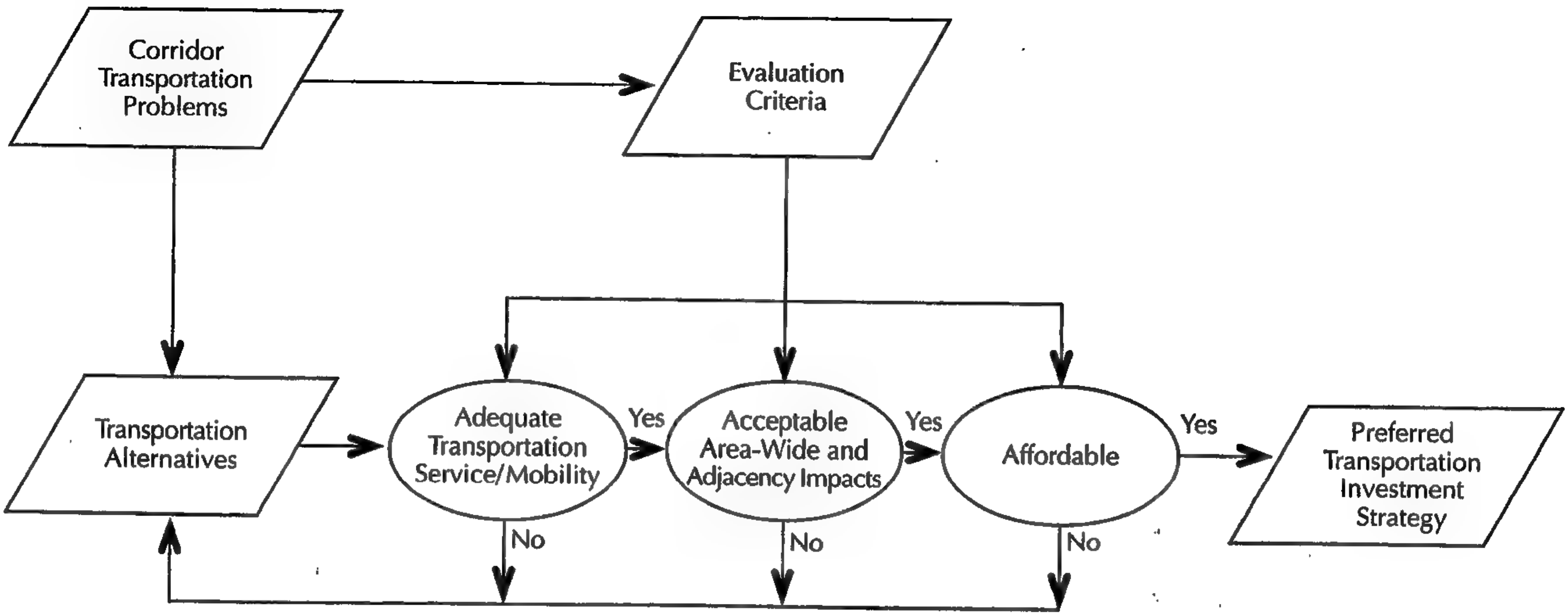
- Reduce Existing and Future Vehicle Congestion in Peak Periods.
- Improve Mobility and Access in the I-66 Corridor.
- Reduce Adverse Transportation Related Environmental Impacts.
- Improve Transit Access to Employment Centers in the I-66 Corridor.
- Optimize the Multi-Modal Transportation System in the Corridor.
- Enhance Corridor Transportation System to Serve Existing and Future Land Use.
- Optimize Transportation Investments in the I-66 Corridor.

## 2.2 EVALUATION PROCESS

Evaluation of the alternatives will be accomplished by the following a three step screening process:

Screen 1: Fatal Flaw Analysis
Screen 2: Major Criteria
Screen 3: Selection of the Locally Preferred Strategy (LPS)

Each screen has a specific function which leads to the identification of the locally preferred strategy.




I-66 Major Investment Study

BRW

Figure

**Planning Process**

Screen 1: Fatal Flaw Analysis

The major purpose of this screen is to identify likely environmental, operational and physical impacts which are so severe that implementation of a particular alternative ultimately would be precluded. The alternatives that are evaluated under this screen will be developed to enable identification of order of magnitude capital and operating costs. The evaluation will also include environmental criteria. Travel demand numbers will be based on the No Build alternative. Input to the process at this stage will be received from the public and the Technical Advisory Committee on the issue of environmental or physical significance that should be part of this initial analysis. Public input on issue of concern for the alternatives will be obtained via the first public information meeting..

The major focus of this initial evaluation shall be to identify differences among the alternatives that would be considered too significant as to render the alternative unlikely to be implemented. For this analysis, a" Universe of Alternatives" of no more than 16 build alternatives will be analyzed, and no more than 10 alternatives would be carried to the next level of design development.

Screen 2: Major Criteria

Alternatives that survive the fatal flaw analysis will be further evaluated in greater detail as needed to understand the travel demand, property, capital, operating and environment benefits and/or effects. As the title states, the evaluation of these alternative will be subjected to the full range of criteria developed for evaluating the I-66 MIS alternatives. Based upon this evaluation, the 10 alternative would be reduced to no more than 6 alternatives for further refinement and analysis.

Screen 3: Selection of Locally Preferred Strategy (LPS)

Building on the findings of the two previous screenings, the remaining alternatives will be evaluated at a level of detail necessary to draw general comparisons among different alternatives. The evaluation conducted will be structured to provide a point of departure for more detailed environmental evaluation that will be conducted as part of the preparation of future NEPA documentation. The screening will also provide the necessary level of detail to evaluate the individual benefits of each alternative in meeting the goals identified in the study Purpose and Need Statement. The outcome of this final screen would be the identification of a Locally Preferred Strategy which would include one or more of the alternatives.

Given the goals of the I-66 MIS study and the MIS process under the revised Federal evaluation guidelines, the following evaluation criteria and methodology is provided. Six primary evaluation factors will be used during the evaluation process. These are summarized as:

- Environmental
- Costs
- Mobility Improvements
- Operating Efficiencies
- Transit Supportive Land Use Policies
- Cost-Effectiveness

The evaluation methodology applies the three step screening process to the evaluation based upon the above criteria.

The initial screen, or Fatal Flaw Analysis will concentrate on the environmental, the improvement of mobility and costs. The evaluation will focus on ridership, environmental "fatal flaws", community acceptance, and costs.

The second or Major Criteria screen will focus on the benefits and performance of each of the surviving alternatives based upon a full range of evaluation factors. More detailed level of design will allow for comparison of benefits and impacts associated with each alternative.

The final screen will lead to the selection of the LPS. Again using all of the evaluation factors, this step will focus on the identification of trade-offs. The assessment of trade-offs will identify major decision choices with regard to fiscal effectiveness, benefit/cost, cost-effectiveness and equity.

**ENVIRONMENTAL:**

An important element of the I-66 MIS will be the consideration of Social, Economic, and Environmental (SEE) factors in accordance with Metropolitan Planning Regulations, the National Environmental Policy Act (NEPA), the Federal Transit Act, and Executive Order 12893 "Principles for Federal Infrastructure Investments." In order to comply with these mandates, analysis of SEE factors should be integrated into corridor planning studies early and continuously throughout the planning process. Systematic consideration of SEE factors should be completed during the development of alternatives, the review of alternatives with the public and agencies, and the evaluation of alternatives to select a Locally Preferred Strategy (LPS).

The following text describes the environmental analysis methods and criteria which will be used to address SEE considerations when evaluating alternatives during each of the following three screening processes:

| | |
|---|---|
| Screen 1: | Fatal Flaw Analysis (up to 15 Alternatives) |
| Screen 2: | Major Criteria (up to 10 Alternatives) |
| Screen 3: | Selection of the LPS (up to 6 Alternatives) |

The methods and criteria described have been developed assuming that the I-66 MIS is exercising Option 1 for compliance with NEPA. Under Option 1, preparation of required NEPA documentation (Draft Environmental Impact Statement (DEIS) or Environmental Assessment) will be undertaken following completion of the MIS, identification of a LPS, and inclusion of the elements comprising the LPS into a fiscally constrained Regional Transportation Plan and the Transportation Improvement Program.

The overall goal of the environmental screening process used during the I-66 MIS will be to ensure consideration of the cumulative effects of different alternatives on SEE factors before decisions are made. This goal will be achieved by using a proactive, systematic, interdisciplinary approach, founded upon the results of public involvement and resource agency coordination. The five public meetings will be scheduled at key decision-making points during each of the three screening levels to solicit public opinion on the alternatives being considered and the potential associated environmental issues. Resource agency consultation will occur at similar junctures, in such venues as the VDOT Interagency Coordination Meeting, corridor field tours, and interviews with key resource agency personnel as necessary to solicit agency positions regarding potential impacts to significant resources. As part of

this consultation, the resource agencies personnel will be kept advised of the overall schedule and process for decision-making, and will be provided with notice of public meetings.

Information sufficient to differentiate among alternatives and to support the elimination of alternatives from future consideration will be recorded in a format suitable for inclusion in future NEPA documents. Supporting documentation will include views expressed by the public and resource agencies regarding key environmental concerns. By the end of the environmental screening process, the following objectives will have been achieved:

- Key resources in the corridor with the potential to affect decision-making will be identified and located;
- General order of magnitude impacts necessary to differentiate between alternatives will be identified;
- Agency and public positions on identified impacts will be recorded;
- Avoidance, minimization and mitigation options will be documented; and
- Regulatory requirements, recommended future coordination and other next steps will be identified.

**COSTS:**

The costs of implementing alternatives is a major consideration, as financial feasibility and the dollar amounts of the proposed investment plays a major role in the decisions-making process. Thus, the total capital costs as well as the annual operating and maintenance (O&M) costs for alternatives relative to their performance and impacts is a significant consideration.

Capital cost estimates will be developed to identify the total capital cost and annualized capital costs for each alternative and the change to the TDM/TSM/ITS Bus Service Alternative as well as to the No Build alternative. Annualized capital cost will be developed using a --- percent discount rate and useful lifetimes as defined in the FTA Procedures and Technical Methods for Transit Project Planning as well as FHWA and VDOT sources for highway components.

Annual O&M costs will be developed based FTA guidelines as well as existing baseline data from VRE and Metrorail for transit alternatives. The detail methodology for O&M costs may be found in the Operating and Maintenance Methodology Report.

**MOBILITY IMPROVEMENTS:**

The ability of study alternatives to address the identified mobility deficiencies in the I-66 Study Area is one of the most fundamental measures of the effectiveness of the alternatives. The criteria associated with mobility improvements include the assessment of system-level and corridor-level boardings by transit mode (local bus, express bus, rail, total) and the change as compared to the No Build alternative. The mode split and travel time savings, again on a system-level and corridor-level basis by transit, HOV or single-occupant vehicle (SOV), are also components of mobility improvements.

## TRANSIT SUPPORTIVE LAND USE POLICIES:

The evaluation of alternatives must consider land use benefits under the revised FTA guidelines. The revised FTA measures regarding land use policies is now focused on land use inputs, rather than land use outcomes. Thus, a proposed transportation investment would be evaluated in terms of its ability to strengthen or weaken existing or proposed land use goals. The end effect of this type of evaluation will be to reward municipalities or regions which focus their land use planning efforts on the establishment of transit oriented patterns.

One of the goals of the land use criteria is the assessment of the receptiveness of the local land use market to transit-supportive land use patterns. High density land uses is a critical component of this receptiveness. Careful transit station, or park-n-ride site planning which accommodates pedestrian-oriented facilities and mixed use developments is also an important element. Based upon these objectives, the criteria will focus on current land use conditions, future goals of the corridor and the existing and proposed strategies in place to achieve the future goals. In general, land use performance measures will address land use patterns, policies, process, participants, practice and performance. Projects will rated high, medium or low based upon the degree to which these criteria have been met.

## COST-EFFECTIVENESS:

Cost-effectiveness has been used in the past as the primary measure of evaluation for proposed projects. This measure was expressed as a cost per new transit rider, which incorporated travel time savings for existing riders. Typically, costs refers to the total operating and capital costs of the alternative, while effectiveness measures the additional trips or passenger miles on transit.

In this MIS, alternatives include multi-modal improvements which go beyond transit riders or additional passenger miles on transit. In order to capture the benefit of alternatives have combinations which include roadway improvements or HOV enhancements, the measurement of effectiveness will be the Benefit-to-Cost ratio (b/c).

## SECTION 3 - EVALUATION OF EFFECTIVENESS

**Measures of Effectiveness**

Where evaluation criteria represent study goals within the broader environment of policy benefits, measures of effectiveness consist of data by which the alternatives are evaluated. Evaluation criteria are assessed by one or more Measures of Effectiveness (MOE), depending on the scope of the criteria. Some of the MOE's require stand alone quantitative results, some require comparison against the baseline condition (No Build alternative), and a few require qualitative assessments, tempered by study team experience and public input.

**Rating Scale**

Once data for the measures of effectiveness have been collected and calculated, the alternatives will be rated as to performance in achieving study goals and objectives. The rating scales for all the evaluation criteria ranges from one (worse) to five (best). Ratings will be assigned based upon an MOE's performance relative to study goals and its comparison to the performance of other alternatives.

**Relationship to NEPA Process**

Although the preparation of a draft environmental document leading to an approval of the Locally Preferred Strategy (LPS) is not required within an Option 1 Major Investment Study, proposed alternative social, economic, and environmental effects must be analyzed to a level of detail to allow comparison among alternatives. Subjects addressed and the level of analytical analysis should be consistent with the requirements of the joint FTA and FHWA environmental regulations along with applicable laws and regulations.

**Environmental Measures of Effectiveness**

**Screen 1: Fatal Flaw Analysis**

***Purpose:***

The major purpose of the "Screen 1: Fatal Flaw Analysis" is to identify likely environmental impacts which are so severe that implementation of a particular alternative ultimately would be precluded because of regulatory considerations, resource agency positions, public opinion, or sheer magnitude of impact. A second but equally important function of the fatal flaw analysis will be to build a record demonstrating that legislative requirements to evaluate alternatives which avoid or minimize impacts to specific resources have been satisfied. Resources subject to such legislative requirements are as follow: floodplains, wetlands, endangered species, air quality, Section 4(f) properties (parks, historic properties, wildlife refuges), and Section 6(f) properties (land and water conservation fund lands). Up to 15 alternatives will be subjected to Screen 1 evaluation.

***Method and Criteria:***

The fatal flaw analysis will be conducted largely based upon published secondary data sources,

supplemented by spot windshield surveys in areas which are identified as being of particular concern by the public and resource agencies. The presence of the following SEE factors will be identified and graphically represented at a gross scale during the fatal flaw analysis: floodplains, wetlands, endangered species habitat, parklands, historic properties, residential areas, noise sensitive receptors, and recorded sites of contaminated materials. At the first public meeting, the 15 alternatives identified for study and the proposed environmental screening program will be discussed with attending citizens and agency representatives to solicit their opinions and recommendations.

The fatal flaw analysis will be based upon an order of magnitude assessment of impacts across a spectrum of qualitative criteria for each key SEE factor. The major focus of the analysis will be to assess the ability of each alternative to fit into the existing built environment. Impacts associated with each alternative will be assessed for each SEE factor identified as likely to be a discriminator among the alternatives under consideration. The qualitative criteria will be developed based upon an understanding of the fundamental nature of the use and physical configuration of the affected resource, in a way that would allow a common sense assessment of the degree of impact, based upon the values expressed by agencies and the public. For each SEE factor to be considered, the evaluation criteria for Screen 1 will developed by answering the following series of questions, proceeding only as far down the list as necessary to differentiate among the alternatives:

Is there an impact to an identified SEE Factor?
Yes No

What is the nature of the impact on the identified SEE Factor?
Direct Indirect Both

What is the comparative order of magnitude significance of the impact on the identified SEE Factor?
Very High High Medium Low

What is the potential to avoid or minimize potential impacts during future project planning?

Excellent Good Fair Poor Remote None

What is the possibility of successful mitigation?
None Not Probable Probable Highly Likely

***Products:***

- An annotated matrix summarizing the probability (none, low, medium, high) that potential impacts to SEE resources associated with each alternative are likely to be a fatal flaw.

- A summary of data sources, agencies consulted and key assumptions used in the analysis.

### Screen 2: Major Criteria

***Purpose:***

Under "Screen 2: Major Criteria," those alternatives that survive the fatal flaw analysis will be further evaluated in greater detail as necessary to understand their potential environmental effects and the ways in which identified impacts can be avoided and minimized. An important function of this screening process will be to coordinate with the conceptual engineering process so that environmental conflicts can be identified and resolved as the alternatives are refined. The screening process will be designed to build upon the findings of the fatal flaw analysis to ensure that legislative requirements regarding consideration of alternatives to avoid floodplains, wetlands, endangered species, Section 4(f) properties (parks, historic properties) and Section 6(f) lands are satisfied. Up to 10 alternatives will be reviewed during the Screen 2 evaluation.

***Method and Criteria:***

As in the fatal flaw analysis, the environmental evaluation will be focussed on those SEE factors which are likely to affect decision-making: i.e., those factors which are critical to distinguishing among alternatives. It is anticipated that at this stage, the following factors will be most critical to differentiating among the alternatives: land use adjacencies, the aquatic ecosystem, and visual impacts. The screening analysis will be completed based upon the published secondary data and windshield survey data used during the fatal flaw analysis, supplemented by aerial photography and spot site visits in areas where the potential for impact is expected to be the greatest, such as in station areas. Screen 2 evaluation will consist of the following steps:

- Review possible evaluation criteria;
- Recommend candidate evaluation criteria;
- Refine evaluation criteria based on public and agency input; and
- Apply selected criteria to alternatives.

The possible evaluation criteria will be based upon a combination of qualitative measures, supplemented by quantitative measures as necessary to distinguish among alternatives. The initial questions identified during the fatal flaw analysis will be supplemented as necessary with the following:

What proportion of the identified SEE resource is subject to impact?
All Most Half Less than Half Fragment

How diminished will the functionality of the identified SEE resource be?
Completely Mostly Partly Not at all

What is the value of the identified SEE resource in the larger system of which it is a part?
Very High High Medium Low

Sample quantitative criteria may include such measures as number of acres, linear feet, or number of features, if such measures are necessary to differentiate among alternatives. A key element of the analysis will be to ensure that the measures selected accurately reflect the significance of the impact as expressed by the public and agencies. Simple quantification of impacts in the absence of

understanding the significance of the resource to the public can inadvertently misdirect the analytical process. For example, a 2 acre encroachment caused by a minimal intrusion along the perimeter of an historic parkland could potentially be perceived by the public and resource agencies as less intrusive to the use and enjoyment of the resource than a 1/2 acre encroachment which bisects the property. If the selected measure for evaluating parkland impacts is based on acreage impacted alone, then the alternative with a 2 acre impact appears to be worse than the alternative with the 1/2 acre impact, when in fact the reverse may be true. During the screening process, it will be important to focus both on the appropriateness of the selected measures, and on understanding the nature and function of the affected resource itself and the larger system of which it is a part. An open, continuous dialogue with the public and the resources agencies will be an important element in ensuring that the selected criteria and measures accurately capture public concerns regarding potential impacts to foster a collaborative decision-making process.

***Products:***

- A comparative matrix using graphic symbols and text narrative to summarize potential impacts associated with each alternative for each of the SEE factors pertinent to the decision-making process.

- A summary of data sources, agencies consulted and key assumptions used in completing the analysis.

**Screen 3: Selection of LPS**

***Purpose:***

Building on the findings of the two previous screening levels, the remaining alternatives will be evaluated at a level of detail necessary to draw general comparisons among different options. The evaluation conducted during this phase will be structured to provide the point of departure for more detailed environmental evaluation that will be conducted as part of the preparation of future NEPA documentation. Up to six alternatives will undergo Screen 3 evaluation.

***Method and Criteria:***

The first step in this process will be to decide upon an appropriate level of detail for the SEE impact analysis. The level of detail will be in sufficient depth to answer the following questions:

- Where are the major sensitive resources in areas subject to impact?

- What and where are the critical impacts likely to occur?

- Who are the Agencies with jurisdiction or interest in the resource?

- Who are the major players in the decision making process?

- What additional information that is needed to understand potential impacts can be gained through the collaborative process?

Effects of the alternatives on the following SEE factors will be considered as necessary to differentiate among alternatives. At this time, it appears that the SEE factors discussed below are likely to be of the greatest concern in screening alternatives and influencing decision making. If other SEE factors are identified by the public or resource agencies as being of concern during the decision making process, criteria and measures will be developed as appropriate.

Land Use: Based upon land use mapping and comprehensive plans available from local jurisdictions, aerial photograph interpretation and coordination with local planners, alternatives will be assessed based upon the following criteria: compatibility with existing land use, consistency with adopted plans and zoning, and the degree to which local land use policies are supportive of transportation investment. Qualitative measures will be used to address the potential benefits anticipated as well as potential conflicts. Local and regional land use planners will be consulted as part of the evaluation process.

Displacements\ Relocations: Based primarily upon aerial photo interpretation, a quantitative estimate of the number of displacements required will be prepared by residential units, businesses, institutions and public facilities. If necessary to distinguish among alternatives, Census data on the socioeconomic characteristics of affected areas may be analyzed to identify potential impacts to minority and disadvantaged populations. For example, possible measures of impact assessment might include percentage of minority households, or number of minority owned businesses affected.

Neighborhoods: The potential effects (both positive and negative) of each alternative on community quality of life will be described in terms of such factors as land use change, secondary development potential, neighborhood character, community cohesion, and introduction of new visual elements. The analysis will be focussed on those areas where the potential for effects is greatest, such as station sites, deviations from established rights-of-way, or areas of concern identified by community groups and residents. The analysis will draw on input received from the public and local community planners.

Transportation: Alternatives will be assessed in terms of transportation-related impacts and benefits as they relate to neighborhood quality of life. Criteria will include the relative changes in traffic volumes through residential areas, pedestrian and vehicular safety, access to community facilities, and introduction of physical barriers to existing circulation patterns. The evaluation will be based on modelling output, land use data, and site visits. Coordination will be undertaken with local transportation engineering, transportation planning and community planning staff.

Noise: Potential noise impacts could occur as a result of increases in traffic volumes or changes in traffic patterns, or the introduction of rail improvements. The alternatives will be compared based upon the number of noise sensitive receiver sites subject to substantial increases in noise. These noise sensitive receiver sites may include homes, institutions and community facilities (schools, libraries, parks). The evaluation will be based upon FHWA Highway

Noise Abatement Criteria and FTA Transit Noise and Vibration Impact Assessment Criteria (April 1995). Primary data sources will include aerial photo interpretation, comprehensive plan maps, and field spot checks.

Air Quality: Macro-scale evaluation criteria will be applied to each alternative to assess the potential for regional and localized changes in air quality. Each alternative will be evaluated and ranked in terms of the predicted change in VMT and the resultant effect on regional air pollution emissions ($NO_x$, VOC, CO). The potential for each alternative to contribute to a reduction in regional pollution burdens will be calculated by multiplying the predicted change in VMT by standard emissions rates. Localized changes (CO) will be assessed based on the potential for each alternative to positively or negatively affect areas where violations have been previously identified in SIP documentation and other available studies. As part of the evaluation process, EPA, WCOG and local air quality planners will be consulted.

Aquatic Ecosystem\ Water Resources: Based upon secondary data sources (County GIS databases, local plans, USGS maps, National Wetland Inventory maps, FEMA maps, County Soil Surveys), aerial photography, and other data provided by the resource agencies during consultation, the alternatives will be compared with respect to their impacts on surface water, wetlands and floodplains. Likely criteria to be assessed will include: number of stream crossings; number, acreage and type of wetlands impacted; acreage of hydric soils impacted, and floodplain acreage impacted. These criteria may be altered if it is determined in consultation with appropriate regulatory agencies that these measures are not appropriate surrogates against which to screen alternatives. The forum provided by the VDOT Interagency Coordination Meeting will be used as a point of departure for resource agency coordination. The collaboration process will be supplemented by field tours with various resource agencies (COE, EPA, USFWS, VA Dept. of Env. Quality, VA Dept. of Game and Inland Fisheries etc.) as necessary to explore impacts to critical resources and by coordination with local planning agencies.

Historic Properties: The alternatives will be evaluated in terms of potential to impact identified historic properties (including archaeological sites) which are either listed on or eligible for inclusion in the National Register of Historic Places (i.e, those protected under Section 4(f) and Section 106). Assessment measures may include number of structures impacted, number of sites impacted, acreage of property impacted, or alteration to the historic context caused by visual intrusion, elevated noise levels, or changes in access. The analysis will rely primarily on local inventories, information provided by the State Historic Preservation Officer (SHPO) and the National Park Service, supplemented by windshield field surveys. The SHPO, the Advisory Council on Historic Preservation, and the National Park Service will be given the opportunity to participate in the screening process.

Parklands: Based upon information contained in local plans and provided by federal, state and local agencies with jurisdiction over parkland resources, the alternatives will be evaluated based upon their potential to directly and indirectly affect parkland properties protected under Section 4(f). Criteria to be considered will include number of parklands impacted, acreage impacted, facilities impacted, and functions impacted. Indirect impacts including visual intrusion and noise will also be assessed. Federal, state and local resource agencies will be consulted during the evaluation process.

Contaminated Materials: Based upon a review of existing data sources, alternatives will be evaluated in terms of the number of Superfund sites, landfills, or underground storage tank sites impacted. Coordination with EPA, the State Department of Health, and local health authorities will be undertaken as necessary.

***Products:***

- For each SEE factor assessed, a narrative, impact table and map for inclusion in the MIS report describing the impact assessment process, recording the assumptions made, and highlighting the differences in impact among the alternatives considered.
- For each SEE factor which was not assessed, a one or two sentence explanation as to why the factor would not have further enabled differentiation among the alternatives.
- A summary evaluation matrix comparing alternatives across SEE factors.

**COST MEASURES OF EFFECTIVENESS:**

SCREEN 1: Fatal Flaw Analysis

Capital Costs

Order of magnitude capital costs will be developed and compared under this screen. Cost per mile estimates for construction of rail, HOV,and roadway improvements will be used to compare the costs of the individual alternatives. At this level of analysis, property acquisition and right-of-way costs will not be included in the estimate. Unit costs will be based upon similar projects or improvements constructed in the region or nationally. All costs will be in terms of 1995 Dollars.

Operating & Maintenance Costs

Order of magnitude O&M costs will be determined for each alternative. The cost will be based upon total length, type of service provided and will be based upon the costs of similar existing systems or improvements of the same size.

SCREEN 2: MAJOR CRITERIA

Capital Costs

Capital costs will be developed under this second screen in greater detail, based upon greater engineering detail cost will be developed on unit costs for civil, structure, vehicle and systems.

Capital cost will include soft costs associated with design, construction management and construction contingency.

Measures at this second screen will include total and annualized capital cost as well as cost per user. User will be defined as transit riders or auto passengers and driver. This will account for the inclusion of highway as well as transit elements in the individual alternatives.

Operating & Maintenance Costs

Based upon the O&M Methodology Report, costs for the second screen will be based upon more detail, alternative specific cost build-up. Measures of effectiveness will include annualized operating cost per alternative and annualized cost per user. Incremental cost per new user will also be measured for each alternative.

SCREEN 3: SELECTION OF THE LPS:

Based upon the unit costs developed for screen 2, both capital and operating costs will be compared similar to screen 2. It is anticipated that the alternatives in this screen will reflect the comparative analysis of the alternatives evaluated in screen 2, and therefore be refinements to address potential impacts identified in the previous screening step.

**MOBILITY IMPROVEMENT MEASURES OF EFFECTIVENESS:**

SCREEN 1: Fatal Flaw Analysis

Travel Time Savings

For this initial screening, travel time savings for the individual alternative will be identified as compared to the No Build alternative. This savings would be for all services used in the corridor to include the fact that some alternatives employ both transit and highway improvements. Alternatives which have poor travel times savings compared to both the No Build and Build Alternatives will be noted and rated on a scale of 1 to 5. The lower the rating the less the travel time relative to other alternatives tested.

Vehicle Mile Travelled (VMT)

Alternatives will be evaluated based upon the vehicle miles travelled under each of the build alternatives relative to the No Build alternative and each other. The evaluation measure will take into consideration those alternatives that still utilize vehicle modes such as HOV lanes, or improvements to roadways.

Vehicle Hours Travelled (VHT)

Similar to VMT, the vehicle hours of travel will be determined for each of the alternatives under the fatal flaw analysis.

**SCREEN 2: MAJOR CRITERIA**

Under this screening of the alternatives, the mobility improvements will be measure by identifying such measures as transit ridership, mode split, and travel time savings.

Transit Ridership

Transit ridership will vary depending on the type of transportation improvement selected for implementation. The change in transit ridership reflects the impacts on travel demand which occur in response to the availability of different modes of travel. Transit ridership forecasts are conducted in terms of linked and unlinked trips. A linked transit trip represents an entire trip from point of origin to the point of destination, regardless of whether a transfer or mode change was made. An unlinked transit trip accounts for each individual transit trip completed between the point of origin and destination. Thus, the number of linked trips will always be less than unlinked trips. Linked trips represent total system ridership. Unlinked trips provide a method for determining the number of persons using the different modes and routes available within in the system. Under screen 2 evaluation, both the unlinked trips by mode and linked trips or system ridership will be measured.

Mode Split

The share that each mode of transportation has in each alternative, provides an insight as to the relative effectiveness of inducing shifts from existing SOV, HOV or transit shares. Depending on the alternatives, the mode split between HOV, SOV and transit will vary. To the extent that the share of SOV trips decreases and HOV or transit increases in each alternative, the mobility in the corridor should improve. For each alternative, the mode split will be identified and used as measure of efficiency for the alternative to the extent that SOV share decreases. It will also provide insight into the relative attractiveness of similar alternatives such as HOV or LRT to be able to identify elements that may influence the attractiveness.

Travel Time Savings

Similar to the Fatal Flaw Analysis, the Screen 2 evaluation will identify travel time savings for the users of each alternative over the No Build alternative, as well as the differences between alternatives.

**SCREEN 3: SELECTION OF THE LPS:**

The same measures of effectiveness proposed for screen 2 will be used in the final screen to identify the differences and benefits of the final alternatives, so as to be able to identify the Locally Preferred Strategy.

**TRANSIT SUPPORTIVE LAND USE POLICIES**

**SCREEN 1: FATAL FLAW ANALYSIS**

Under this criteria, a qualitative assessment would be made during the screening process to assess whether the alternative would have either a positive or negative impact on supporting the transit land use policy as it exists in the corridor under the future 2020 year conditions. Input from the TAC members as well as local officials would be solicited in attempting to assess the impact of each of the alternatives.

**SCREEN 2: MAJOR CRITERIA**

In this screen the number of area that would be influenced by the presence of the alternative would be quantified, possible quantification would be on the number of activity or development centers that would benefit as a result of the alternative. A rating of 1 to 5 would be given, with the highest rating accorded the alternative that had the most centers or developments potentially benefiting.

**SCREEN 3: SELECTION OF THE LPS:**

The same measure of effectiveness used in the previous screen would again be used in this final screening. Potential refinements in each of the alternatives between screen 2 and screen 3 could result in changes to the individual alternatives ability to be transit supportive of land use policies.

**COST-EFFECTIVENESS MEASURES OF EFFECTIVENESS:**

**SCREEN 1: FATAL FLAW ANALYSIS:**

No analysis of cost-effectiveness would be done under this initial screening. Additional detail design and analysis will be required.

**SCREEN 2: MAJOR CRITERIA**

Under this second screening each alternative would be evaluated for the following:

- o Change in Passenger Travel Time in Congested Conditions
- o Cost (Capital Cost) per Incremental Capacity Provided
- o Incremental (Capital & Operating) Cost/Incremental Non-SOV user

All costs developed under this screening will be for annualized costs.

**SCREEN 3: SELECTION OF THE LPS:**

In addition to the evaluation measures use in the previous screening, in the final screen, the following will be evaluated:

- o Capital Cost per new rider
- o Total annual cost per passenger mile
- o Operating surplus/deficit per rider

The measures of effectiveness analysis will determine whether the alternatives are effective in the achievement of transportation service goals articulated by the project participants. Under each goal are listed the criteria which will be used to evaluate the alternatives and the measures of effectiveness which will be used to perform the evaluation.

Goal: Reduce Existing and Future Vehicle Congestion in Peak Periods.

Evaluation Criteria - Roadway Congestion
Measures of Effectiveness:
Level of Service on corridor roadway with and without improvement.
Vehicle miles of travel on the regional roadway system with and without improvement.
Vehicle hours of travel on the regional roadway system with and without improvement.

Goal: Improve Mobility and Access in the I-66 Corridor.

Evaluation Criteria - Accessibility

Measures of Effectiveness:

Door-to-door travel times between representative origin-destination pairs. The primary source of data will be the regional travel model.

Evaluation Criteria - Convenience

Measures of Effectiveness:

Service frequency with and without improvement.

Service reliability

Clarity and simplicity of use.

Evaluation Criteria - Comfort

Measures of Effectiveness:

Ride quality and Ease

User perception of personal security.

Evaluation Criteria - Transit System Ridership

Measures of Effectiveness:

Transit system patronage forecasts.

Mode splits.

Goal: Reduce Adverse Transportation Related Environmental Impacts.

Evaluation Criteria - Environmental Impacts which Represent Fatal Flaws

Measures of Effectiveness:

Visual and aesthetic impacts.

Cultural resources impacts.

Noise and vibration impacts.

Air Quality Impacts.

Energy impacts.

Soils and geology impacts.

Ecosystems impacts.

Water quality and hydrology impacts.

Hazardous waste and materials impacts.

Parklands impacts.

Goal: Improve Transit Access to Employment Centers in the I-66 Corridor.

Evaluation Criteria - Activity Centers/Developments served

Measure of Effectiveness:

Comparative number of areas served.

Evaluation Criteria - Reverse Commute Accessibility

Measure of Effectiveness:

Degree to which system serves reverse-commuter demand.

Goal: Optimize the Multi-Modal Transportation System in the Corridor.

Goal: Enhance Corridor Transportation System to Serve Existing and Future Land Use.

Goal: Optimize Transportation Investments in the I-66 Corridor.

Evaluation Criteria - Capital Cost
Measure of Effectiveness:
Comparative capital cost.

Evaluation Criteria - Operating and Maintenance Cost
Measure of Effectiveness:
Comparative operating and maintenance cost.

Evaluation Criteria - Annual Cost
Measure of Effectiveness:
Comparative annual cost.

Evaluation Criteria - Cost-Effectiveness
Measure of Effectiveness:
Capital cost per new rider.
Total annual cost per passenger mile.
Operating surplus/deficit per trip.
Change in Passenger Travel Time in Congested Conditions.
Cost (Capital Cost) per Incremental Capacity Provided.
Incremental (Capital & Operating) Cost/Incremental Non-SOV user.

## SECTION 4 - TRADE-OFF ANALYSIS

The completion of the evaluation described above will almost certainly reveal that some alternatives perform better than the others in one or more areas, and that other alternatives will more effectively satisfy other criteria. It is also almost certainly true that some alternatives will outperform other but at a higher monetary, social or environmental cost.

These circumstances describe a condition in which a choice can only be made by assessing and making compromises and trade-offs.

The presentation of the trade-off analysis will focus on net differences between alternatives and the resulting costs and benefits of those net differences.

DRAFT

# OPERATING AND MAINTENANCE COST METHODOLOGY REPORT

for the

I-66 Corridor
Major Investment Study

Prepared for

Virginia Department of Rail and Public Transportation

in cooperation with

Federal Transit Administration
Federal Highway Administration
Arlington County
Fairfax County
Fauquier County
Loudoun County
Prince WilliamCounty
City of Fairfax
Washington Metropolitan Area Transit Authority
Virginia Railway Express
Northern Virginia Transportation Commission
Potomac and Rappahannock Transportation Commission
Metropolitan Washington Airports Authority
NCR Transportation Planning Board

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# SECTION 1 - INTRODUCTION

This report presents the process which will be used to develop operating and maintenance (O&M) costs estimates for I-66 Corridor MIS. Resource build-up cost models are presented for existing and proposed transit modes: bus, Metrorail, light rail transit (LRT), commuter rail (VRE), and HOV. Each model estimates costs based on projected system operating statistics. These cost models are consistent with the methodology specified by the Federal Transit Administration for corridor Major Investment Studies (MIS).

Steps required for estimating O&M costs are as follows:

1. Development of an O&M cost model for each mode,
2. Calibration of the models for current year of operations,
3. Validation of the model for prior year operations,
4. Generation of operating plans and statistics for each study alternative, and
5. Calculation of annual operating and maintenance (O&M) costs.

Separate O&M cost models are developed for each transit mode. For existing modes in the corridor, the model is developed from 1995 operational and financial data. Since LRT is not in operation in the northern Virginia region, the LRT model is based on financial and operating data for light rail transit systems in Sacramento, Buffalo, Los Angeles, Santa Clara County, San Diego and Portland. The LRT cost model is adapted for the I-66 corridor by using Metrorail wages and fringe benefit rates, and local energy rates.

# SECTION 2 - BUS O&M COST MODEL

This section presents the O&M cost model for transit bus and paratransit operations. Included in the following paragraphs is a general overview of the model, input variables and formulas used in the calculation of labor and non-labor costs. The section concludes with a discussion of the model validation procedure.

## 2.1 GENERAL MODEL DESCRIPTION

The cost model is a disaggregate, resource build-up model. Line item costs are determined according to the quantity of service supplied and other system characteristics. The cost model is based on the existing organizational structure of each transit provider and the agency's fiscal year 1995 adopted budget. Labor and non-labor costs for the following departments shall be included:

Administration
- Training
- Service Development
- Paratransit Administration
- Finance (Finance, Fare Maintenance and Collection)
- General Administration
- General Functions

Transit Operations
- Transportation
- Vehicle Maintenance
- Non-Vehicle Maintenance
- Safety Department
- Transit Administration

For all the departments listed, expenses for each object class (e.g., labor, materials, utilities) are modeled on a separate line to ensure that the equations are mutually exclusive and cover all operating costs.

Non-labor expense categories are defined as follows:

- Services
- Materials & Supplies
- Utilities
- Casualty & Liability
- Purchased Transportation
- Miscellaneous
- Expense Transfers
- Leases and Rentals
- Interest Expense

The cost model will be developed in a spreadsheet format and include the following tables:

- Table 1 - Input Variables
- Table 2 - Line Item Summary
- Table 3 - O&M Cost Estimates by Department and Cost Type

- Table 4 - O&M Cost Estimates by Section 15 Account

Following is a brief description of each table.

## 2.2 INPUT VARIABLES

A total of 10 input variables will be used to describe operating requirements and system characteristics for each operating agency. All line item costs are linked either directly or indirectly to one or more of the input variables. Each of these variables will need to be estimated for the study alternatives based on proposed operating plans and ridership forecasts. Input variables for the cost model are as follows:

- **Total Annual Unlinked Passengers Trips** - Total annual ridership for the study alternatives will be based on average weekday ridership forecasts multiplied by an annualization factor appropriate for the type of service.
- **Peak Buses** - This is the maximum number of directly-operated transit buses in scheduled service during the A.M. or P.M. peak hour (whichever is greater).
- **Annual Revenue Vehicle-Miles** - The total directly-operated bus-miles in revenue service, excluding deadhead mileage.
- **Annual Revenue Vehicle-Hours** - The total directly-operated bus-hours in service, excluding report and deadhead time.
- **Service and Inspection Garages** - The number of maintenance garages in the system.
- **Purchased Transportation Total-Hours** - This variable represents the number of demand response total bus-hours contracted to private operators.

In addition, the Input Variable Table will allow the user to specify the forecast year. This variable can be used as a mechanism to change unit costs for future years. For example, the unit cost for purchased transportation service may be expected to change in future years. Also an inflation factor that allows the user to adjust costs will be used.

## 2.4 LABOR COSTS

Labor costs are a function of the number of employees in each job classification and the average annual cost per employee. The average cost per employee is to be based on actual wage and fringe benefit rates paid.

The generalized equation for staff positions is in the form:

| | | | | | | |
|---|---|---|---|---|---|---|
| Annual Labor Cost | = | Value of Driving Variable | x | Labor Productivity Rate | x | Annual Cost per Employee |

where:

- **Driving Variable Value** - The quantity of the input variable that affects the number of labor positions (e.g., bus hours).

- **Labor Productivity Rate** - The number of budgeted positions divided by the value of the driving variable for the calibrations (base) level of service. This factor implicitly accounts for local union rules, hiring and training new employees, worker efficiency, and absenteeism.

- **Annual Cost per Employee** - Average annual earnings that include straight wages or salary, vacation, holiday and sick pay. Also included are fringe benefits, such as pension funds, social security, and medical insurance.

## 2.5 NON-LABOR COSTS

Non-labor costs include expense categories such as materials, utilities, and contract services. These expenses are generally a function of the base year cost, and the base and future values of the driving variables. This function assumes that current rates of consumption will continue in future years.

Cost equations used by the model for non-labor items are generally in the form:

| | | | | | | |
|---|---|---|---|---|---|---|
| Annual Non-Labor Cost | = | Total Base Cost | ÷ | Base Driving Variable | x | Future Driving Variable |

where:

- **Total Base Cost** - Actual expense in the base, or calibration year modeled.

- **Total Driving Variable** - The quantity of the input variable in the base or calibration year.

- **Future Driving Variable** - The projected quantity of the input variable of the future year.

## 2.6 LINE ITEM SUMMARY

The line item summary table in the cost model combines labor and non-labor items and calculates costs and staffing requirements based on the input variable. Cost items are categorized by department and division for each operating agency. Within each department, labor cost items are listed first, followed by non-labor costs.

Staffing requirements (full-time employees) are calculated by the percent change in the specified driving variable. For example, the number of bus operators are determined by annual revenue bus-hours. Non-labor costs are also calculated by the percent change in an operating statistic.

## 2.4 COST SUMMARY TABLES

Cost estimates by department and cost type (e.g., labor, services, materials) will be tabulated in summary tables. The last table of the model tabulates costs by FTA Section 15 Account.

## 2.5 VALIDATION

The ability of the bus cost model to accurately estimate O&M costs for study alternatives will be tested by applying the model to three prior fiscal years of operation. The validation test will demonstrate the sensitivity of the model, particularly for prior years where the level of bus service varied from current operations. Input variables and actual O&M costs will be obtained from Section 15 data for each operating agency. Estimated (model) costs will be adjusted for inflation to the specified fiscal year with Bureau of Labor Consumer Price Index data.

# SECTION 3 - LRT O&M COST MODEL

This section presents the O&M cost model for LRT operation. Included in the following paragraphs is a general overview of the model, input variables and formulas used in the calculation of labor and non-labor costs. The section concludes with a discussion of the model validation procedure.

## 3.1 GENERAL MODEL DESCRIPTION

The LRT model structure is similar to the bus cost model, with line item costs tabulated for specific LRT cost centers (e.g., LRT administration, vehicle operations, vehicle maintenance, facilities maintenance and overhead). Line item costs are defined within each cost center as labor, material, services, utilities, energy and miscellaneous costs.

The O&M cost model is based on actual operating budgets for six U.S. light rail systems: Sacramento, Buffalo, Los Angeles, Santa Clara County (San Jose), San Diego and Portland. All are established LRT systems, with directional track route-miles ranging from 12 to 42 miles. This section provides a general description of the model, contracting assumptions that are reflected in the model, and each model component.

Specific line items are included for unique labor positions such as electro-mechanic or train operator, and also for unique non-labor expenses such as traction power or vehicle spare parts. Each labor and non-labor expense item is then modeled as a separate line item to ensure that the equations for estimating expenses are mutually exclusive and cover all operating costs. O&M costs are calculated from the quantity of service supplied and other system characteristics. LRT system cost data include:

| | |
|---|---|
| • Sacramento Regional Transit | FY 1994 budget |
| • Tri-Met (Portland) | FY 1993 costs |
| • San Diego Trolley, Inc. | FY 1994 budget |
| • Santa Clara County Transit District (San Jose) | FY 1994 budget |
| • Los Angeles County Metropolitan Transportation Authority | FY 1993 costs |
| • Niagara Frontier Transportation Authority | FY 1993 costs |

To specifically account for potential LRT costs in the I-66 corridor and northern Virginia region, the cost model will reflects local wage and fringe benefits rates. The allocation of overhead expenses will be based on recent year operating budgets. Overhead costs include functions not directly associated with transit operations, such as General Administration, General Functions, Finance, Paratransit Administration, Service Development and Training. The ratio of overhead to operating costs is applied to LRT direct operating costs.

In recent years, transit agencies have begun to rely on private sector to perform many operational functions with the intent of reducing O&M costs. For example, San Diego Trolley has aggressively used contracts to provide system security, fare inspection, vehicle cleaning, specialized vehicle maintenance and maintenance of way functions. Contracted services that may be assumed in this cost model include:

- Vehicle Maintenance — - Major Component Vehicle Repair
- Facilities Maintenance — - Station/Grounds Maintenance
  - Landscaping/Grounds Maintenance
  - Graffiti Removal
  - Debris Removal
  - Parking Lot Cleaning

- Other Services
  - Elevator/Escalator Maintenance
  - Building Maintenance
  - Security

Similar to the bus cost model, the LRT model uses a series of interactive tables in a spreadsheet format that generates an O&M cost summary table. The spreadsheets will be partitioned as follows:

| | |
|---|---|
| Table 1 | Input Variables |
| Table 2 | Labor Costs by Position |
| Table 3a | Non-Labor Total Costs by LRT System and Cost Type |
| Table 3b | Non-Labor Unit Costs by LRT System and Cost Type |
| Table 4 | Line Item Listing |
| Table 5 | O&M Costs by Department and Cost Type |

The following sections describe each table in the cost model.

## 3.2 LRT INPUT VARIABLES

Input variables determine costs for all line items in the model. Some labor and non-labor cost items are linked to secondary variables such as employment or total cost. For example, the cost of providing and maintaining uniforms is related to the number of mechanics and train operators. The number of mechanics and operators, in turn, is a function of the system operating and vehicle characteristics. Calibration statistics for the LRT cost model will be developed by averaging operating statistics of the six LRT systems. Input variables included in the cost model are as follows:

- **Annual LRT Passenger Trips** - The number of unlinked passenger trips using the LRT system in the forecast year. Average annual ridership for the peer systems is 9.51 million passengers. Average weekday ridership forecasts will be multiplied by an annualization factor to determine annual ridership.

- **Yards** - The number of LRT maintenance and storage facilities.

- **Peak Cars** - The maximum number of LRT vehicles in scheduled service during the A.M. or P.M. peak period. The average number of cars operating in the peak period for the six peer systems is 35 cars.

- **Total Cars** - The total number of LRT vehicles in the active fleet. The six peer LRT systems have an average 45 fleet cars.

- **Annual Revenue Car-Miles** - The total vehicle miles operated in revenue service, excluding deadhead mileage. The six peer LRT systems operate an average 2.18 million annual revenue car-miles.

- **Annual Revenue Train-Hours** - The total LRV train-hours operated in revenue service, excluding report and deadhead time. The average for the peer LRT systems is 66,100 annual revenue train-hours.

- **Directional Route Miles** - The number of directional route-miles of revenue track, excluding yard and tail track. Average route-miles for the peer LRT systems is 34 miles.

- **LRT Passenger Stations** - The number of LRT passenger stations in the system. The average system size for the peer LRT systems is 27 stations.

## 3.3 LABOR COSTS

The cost model assumes that a new LRT department will be created within Metrorail, responsible for all LRT transportation and maintenance functions. Administrative aspects could be accomplished under current Metrorail organization. However, when considering the uniqueness of LRT operations and maintenance, transit agencies typically choose to create a separate LRT department. Four divisions have been assumed within the LRT department: Administration, Vehicle Operations, Vehicle Maintenance and Non-Vehicle Maintenance.

Job classifications have been defined by reviewing staff assignments for each of the six LRT systems. A labor cost list will be included in the model noting various job classifications for the four LRT divisions. Average base salaries and wages for most LRT job classifications will based on local area and Metrorail wage rates for comparable positions. Employee wages reflected in the cost model include sick, holiday, vacation and other paid absences, overtime, and fringe benefits. Employee staffing for the six LRT systems has been reviewed to determine average productivity factors for non-supervisory positions.

## 3.4 NON-LABOR COSTS

Expenses related to non-labor cost items reflect the contract philosophy and operating assumptions discussed earlier in this section. Recognizing that different transit agencies report their non-labor costs in a variety of ways (e.g., some aggregate material costs, while others detail individual purchases), a listing of common non-labor cost items has been prepared from the budgets of the six peer LRT systems. The non-labor cost items were then arranged by LRT department and by cost type (e.g., materials, contract services, utilities and miscellaneous). An annual inflation factor of approximately 3 percent was used to inflate FY 1993 and FY 1994 costs to FY 1995 dollars. Unit costs were then determined for each non-labor cost item (e.g., cost per train-hour of service). For most cost items, the average unit cost of the six peer LRT systems was used in the cost model. However, for select cost items, the unit cost for a particular system was not included in the average. For example, the Los Angeles MTA system security costs are much higher than those reported for other systems. Los Angeles security cost values were not included in the average.

Propulsion power costs will be calculated in a slightly different manner. Power consumption rates for peer systems and energy rates for Metrorail will be used to calculate propulsion power costs. Projected energy consumption/demand rates will be applied to the local area electric rate schedule.

## 3.5 LINE ITEM SUMMARY

The line item summary table combines labor and non-labor items and calculates costs and staffing requirements based on the input variable values. Cost items are listed by LRT department (Vehicle Operations, Vehicle Maintenance, Non-Vehicle Maintenance, LRT Administration and Overhead). Within each department, labor cost items are listed first, followed by non-labor costs.

Staffing requirements based on full time equivalents (FTEs) will be calculated from labor productivity equations for each job classification. The labor cost for each job classification equals the calculated staffing requirement multiplied by the average employee salary. Total labor productivity will be calculated for each department (e.g., vehicle operations employees per revenue train-hour) to check the validity of model results. Similarly, non-labor unit costs will be calculated for each department (e.g., vehicle maintenance non-labor cost per vehicle-mile) for comparison with the average for the peer LRT systems. The line item summary table will list total staffing requirements, labor and non-labor costs.

Additional costs for snow removal can be reflected in the cost model. Labor productivity rates for train operators and controllers will be adjusted to take into account additional labor hours that are required when trains run in non-revenue service to keep tracks clear of snow and ice. Propulsion power costs will be adjusted to take into consideration the additional non-revenue train service. An additional amount per station can be added to station services costs to take into account snow removal.

## 3.6 COST SUMMARY TABLES

Cost estimates by department (e.g., Vehicle Operations) and cost type (e.g., labor, services) will be tabulated in summary tables. The last table of the model will list costs by FTA Section 15 Account.

## 3.7 VALIDATION

The model's ability to accurately forecast O&M costs will be tested by applying average operating statistics for the six peer LRT systems to the cost model. Departmental labor productivity factors calculated by the model will be compared to actual departmental labor productivity factors for the six LRT systems. Operating characteristics to be used for this comparison are as follows:

| | |
|---|---|
| Vehicle Operations | Train-Hours per Employee |
| Vehicle Maintenance | Car-Miles per Employee |
| Non-Vehicle Maintenance | Route-Miles per Employee |
| General Administration | Passengers per Employee |

Figure 3.1 presents labor productivity factors from the cost model. Labor productivity factors for Los Angeles were not available for this validation test. The model successfully generates productivity factors that are within a reasonable range of the actual data for the peer LRT systems. These comparisons also yield some indication of cost effectiveness, for a high productivity factor implies a cost-effective system.

A similar comparison can be made with non-labor unit costs. Departmental non-labor unit costs calculated by the model will be compared to actual departmental non-labor unit costs for the six peer LRT systems. Operating characteristics to be used for this comparison are as follows:

| | |
|---|---|
| Vehicle Operations | Cost per Car-Mile |
| Vehicle Maintenance | Cost per Car-Mile |
| Non-Vehicle Maintenance | Cost per Route-Mile |
| General Administration | Cost per LRT Passenger |

Figure 3.2 presents non-labor productivity factors from the model. The model's non-labor unit cost estimates are within the range of actual non-labor unit costs for the peer LRT systems. This test also provides some indication of system cost-effectiveness, for a low unit cost reflects high cost-effectiveness.

Application of the calibration statistics to the cost model will result in an annual O&M cost estimate, including cost per train-hour and cost per passenger, and an estimate of LRT employees.

Figure 3.1

# I-66 MIS
# Labor Productivity Factors

Figure 3.1 (continued)

# I-66 MIS
# Labor Productivity Factors

Figure 3.2

# I-66 MIS
# Non-Labor Unit Costs

Figure 3.2 (continued)

# I-66 MIS
# Non-Labor Unit Costs

# SECTION 4 - METRORAIL O&M COST MODEL

This section presents the O&M cost model for Metrorail operations. Included in the following paragraphs is a general overview of the model, input variables and formulas used in the calculation of labor and non-labor costs. The section concludes with a discussion of the model validation procedure.

## 4.1 GENERAL MODEL DESCRIPTION

The Metrorail model structure is similar to the LRT model, with line item costs tabulated for specific Metrorail cost centers (e.g., Metrorail administration, vehicle operations, vehicle maintenance, facilities maintenance and overhead). Line item costs are defined within each cost center as labor, material, services, utilities, energy and miscellaneous costs.

Specific line items are provided for unique labor positions such as electro-mechanic or train operator, and also for unique non-labor expenses such as traction power or vehicle spare parts. Each labor and non-labor expense item is then modeled as a separate line item to ensure that the equations for estimating expenses are mutually exclusive and cover all operating costs. O&M costs are calculated from the quantity of service supplied and other system characteristics.

To specifically account for potential Metrorail costs in the I-66 corridor and northern Virginia region, the cost model will reflect current wage and fringe benefits rates. Overhead expenses will be based on recent year actual operation. Overhead costs include functions not directly associated with transit operations, such as General Administration, General Functions, Finance, Service Development and Training. The ratio of overhead to operating costs will be applied to Metrorail direct operating costs.

Similar to the bus and LRT cost models, the Metrorail model uses a series of interactive tables in a spreadsheet format that generates an O&M cost summary table. The spreadsheets are partitioned as follows:

| | |
|---|---|
| Table 1 | Input Variables |
| Table 2 | Labor Costs by Position |
| Table 3a | Non-Labor Total Costs by Metrorail System and Cost Type |
| Table 3b | Non-Labor Unit Costs by Metrorail System and Cost Type |
| Table 4 | Line Item Listing |
| Table 5 | O&M Costs by Department and Cost Type |

The following sections describe each table in the cost model.

## 4.2 METRORAIL INPUT VARIABLES

Input variables determine costs for all line items in the model. Some labor and non-labor cost items are linked to secondary variables such as employment or total cost. For example, the cost of providing and maintaining uniforms is related to the number of mechanics and train operators. The number of mechanics and operators, in turn, is a function of the system operating and vehicle characteristics. Calibration statistics for the Metrorail cost model will be based on the average of recent year operating statistics and current trends. Input variables included in the cost model are as follows:

- **Annual Metrorail Passenger Trips** - The number of unlinked passenger trips using the Metrorail system in the forecast year. Average weekday ridership forecasts will be multiplied by an annualization factor to determine annual ridership.

- **Yards** - The number of Metrorail maintenance and storage facilities.

- **Peak Cars** - The maximum number of Metrorail vehicles in scheduled service during the A.M. or P.M. peak period.

- **Total Cars** - The total number of Metrorail vehicles in the active fleet.

- **Annual Revenue Car-Miles** - The total vehicle miles operated in revenue service, excluding deadhead mileage.

- **Annual Revenue Train-Hours** - The total LRV train-hours operated in revenue service, excluding report and deadhead time.

- **Directional Route Miles** - The number of directional route-miles of revenue track, excluding yard and tail track.

- **Metrorail Passenger Stations** - The number of Metrorail passenger stations in the system.

## 4.3 LABOR COSTS

Job classifications will be defined by reviewing Metrorail staff assignments. A labor cost list will be included in the model noting these various job classifications and corresponding average base salaries and wages. Employee wages reflected in the cost model include sick, holiday, vacation and other paid absences, overtime, and fringe benefits. Employee staffing will be reviewed to determine average productivity factors for non-supervisory positions.

## 4.4 NON-LABOR COSTS

Non-labor costs include expense categories such as materials, utilities, and contract services. These expenses are generally a function of the base year cost, and the base and future values of the driving variables. This function assumes that current rates of comsumption will continue in future years.

## 4.5 LINE ITEM SUMMARY

The line item summary table combines labor and non-labor items and calculates costs and staffing requirements based on the input variable values. Cost items are listed by Metrorail department (Vehicle Operations, Vehicle Maintenance, Non-Vehicle Maintenance, Metrorail Administration and Overhead). Within each department, labor cost items are listed first, followed by non-labor costs.

Staffing requirements based on full time equivalents (FTEs) will be calculated from labor productivity equations for each job classification. The labor cost for each job classification equals the calculated staffing requirement multiplied by the average employee salary. Total labor productivity will be calculated for each department (e.g., vehicle operations employees per revenue train-hour) to check the validity of model results. Similarly, non-labor

unit costs will be calculated for each department (e.g., vehicle maintenance non-labor cost per vehicle-mile). The line item summary table will list total staffing requirements, labor and non-labor costs.

Additional costs for snow removal can be reflected in the cost model. Labor productivity rates for train operators and controllers will be adjusted to take into account additional labor hours that are required when trains run in non-revenue service to keep tracks clear of snow and ice. Propulsion power costs will be adjusted to take into consideration the additional non-revenue train service. An additional amount per station can be added to station services costs for snow removal.

## 4.6 COST SUMMARY TABLES

Cost estimates by department (e.g., Vehicle Operations) and cost type (e.g., labor, services) are tabulated in summary tables. The last table of the model tabulates costs by FTA Section 15 Account.

## 4.7 VALIDATION

The model's ability to accurately forecast O&M costs will be tested by applying average operating statistics for Metrorail to the cost model. Departmental labor productivity factors calculated by the model will be compared to actual departmental labor productivity factors. Operating characteristics to be used for this comparison are as follows:

| | |
|---|---|
| Vehicle Operations | Train-Hours per Employee |
| Vehicle Maintenance | Car-Miles per Employee |
| Non-Vehicle Maintenance | Route-Miles per Employee |
| General Administration | Passengers per Employee |

A similar comparison can be made with non-labor unit costs. Departmental non-labor unit costs calculated by the model will be compared to actual departmental non-labor unit costs for Metrorail. Operating characteristics to be used for this comparison are as follows:

| | |
|---|---|
| Vehicle Operations | Cost per Car-Mile |
| Vehicle Maintenance | Cost per Car-Mile |
| Non-Vehicle Maintenance | Cost per Route-Mile |
| General Administration | Cost per Metrorail Passenger |

Application of the calibration statistics to the cost model will result in an annual O&M cost estimate, including cost per train-hour and cost per passenger, and an estimate of Metrorail employees.

# SECTION 5 - COMMUTER RAIL O&M COST MODEL

This section presents the O&M cost model for Commuter Rail (VRE) operations. Included in the following paragraphs is a general overview of the model, input variables and formulas used in the calculation of labor and non-labor costs. The section concludes with a discussion of the model validation procedure.

## 5.1 GENERAL MODEL DESCRIPTION

The commuter rail cost model is a disaggregate, resource build-up model. As is the case with the LRT model, line item costs are determined according to the quantity of service supplied and other system characteristics. The commuter rail cost model reflects a public operating agency that contracts service from a private operator. Maintenance of line costs include access fees paid to the railroad for use of its tracks.

The commuter rail O&M cost model is based on actual operation of the Virginia Railway Express (VRE) commuter rail lines. Labor productivity factors and unit costs are based on actual operating expenditures for VRE. The model will be validated by comparing model generated cost results on a train-hour, train-mile and car-mile basis to actual commuter rail costs.

FY1993/94 budgeted expenditures for VRE will be used to develop labor productivity factors and non-labor unit costs. The commuter rail cost model will be in a spreadsheet format partitioned into the following tables:

Table 1 Input Variables
Table 2 Line Item Summary

## 5.2 COMMUTER RAIL INPUT VARIABLES

The cost model calibration statistics are the average FY1993/94 operating statistics for VRE. Each input operating statistic will need to be estimated for the commuter rail alternative, based on proposed operating plans and ridership forecasts. Input variables for the model are as follows:

- **Peak Passenger Cars** - The maximum number of commuter rail passenger vehicles and cab control cars in service during the A.M. or P.M. peak period.
- **Annual Revenue Train-Hours** - Commuter operated train-hours in service, excluding report and deadhead time.
- **Average Revenue Train-Miles** - The total operated train-miles in revenue service, excluding report and deadhead time.
- **Annual Revenue Car-Miles** - The total operated passenger and cab control car-miles in revenue service, excluding deadhead mileage.
- **Annual Train Trips** - The total number of revenue train trips made each year, excluding deadhead trips.
- **Directional Route Miles** - The number of directional (one-way) route-miles of revenue track, excluding yard and tail track.
- **Total Stations** - The number of passenger stations in the system.

- **Maintenance Yards** - The number of commuter rail maintenance facilities where major equipment maintenance functions are completed.

- **Outlying Storage Yards** - The number of overnight and/or midday storage yards in the rail system, excluding major maintenance yards. Some light maintenance functions, such as car washing and vehicle cleaning may be performed at these locations.

## 5.3 LINE ITEM SUMMARY

The line item summary table combines labor and non-labor items and calculates costs and railroad staffing requirements based on the input variable values. Cost items are shown as either general administrative costs or contract costs. As noted previously, unit costs are based on budgeted costs for VRE. Line item costs are described in the following paragraphs.

### 5.3.1 Operating Agency Expenditures

Operating agency functions typically assumed for the model are:

- Director of Operations
- Administration and Procurement
- Budget and Finance
- Marketing/Customer Service/Public Relations
- Technical Services

Costs within each department are generally categorized as labor, materials and supplies, professional services and miscellaneous. Insurance costs are included as an operating agency expenditure under Administration and Procurement. Security costs are included as an agency expenditure under Technical Services. Most labor productivity factors and non-labor unit costs in the model will be based on VRE budgeted costs.

### 5.3.2 Contractor Expenditures

Contracted functions in the cost model have been identified as:

- Train Operations
- Maintenance of Equipment
- Maintenance of Line/Rail Line Operating Fees

Labor productivity factors for engineers, conductors and extra board will be based on VRE labor productivity factors (train-hours per FTE). Other train operations unit costs are based on VRE expenditures. Diesel fuel costs will be included under train operations.

Maintenance of equipment and line costs will be based on a VRE expenditures. Access fees cover costs incurred for operating on track that is not owned by the commuter rail agency; these are included in maintenance of line costs. Maintenance of line costs also include utilities and station maintenance.

## 5.4 VALIDATION

The ability of the model to accurately forecast O&M costs will be tested by applying calibration operating statistics as input variables. Model results on a train-hour, train-mile and car-mile basis will be compared to current costs. VRE costs will be based on FY 1994 budgets.

# SECTION 6 - HOV O&M COST MODEL

This section presents the O&M cost model for operation of HOV lanes. Included in the following paragraphs is a general overview of HOV operation, potential model input variables and methods to calculate costs.

## 6.1 GENERAL DESCRIPTION

Operating costs for HOV operations vary significantly based on type of facility and degree of automation. In some locations, HOV operating costs are included with general freeway operations.

HOV facilities are usually classified as concurrent flow, contra-flow, or reversible flow. These facilities can be separated from other traffic by a fixed barrier or delineated by a painted buffer. For fixed barrier HOVs, the related operating costs for access control gates or barriers can be minimal; enforcement and maintenance are included in freeway costs. However, for HOVs where manual control must be employed, operating cost is higher due to the labor required for the placement of cones, pylons, or moveable barriers to delineate HOV lanes.

## 6.2 INPUT VARIABLES

HOV operating costs typically include enforcement, surveillance/control, maintenance, and administration; elements of these cost categories are described below:

- Enforcement often represents the highest cost for HOV operation. Corresponding labor and non-labor costs may be directly attributable to the transit agency as part of the operations control division. Alternatively, enforcement could be performed by local or state police.
- Surveillance would be directly related to labor costs for personnel at the traffic control center who monitor traffic flow along HOV lanes and ramps. Additional labor costs for personnel to manually operated gates or place lane delineators (e.g., cones) would be included in this category.
- Maintenance includes costs for the roadway, automated gates, signs, surveillance equipment, and in some case, vehicles and parking lots.
- Administration would include labor costs for bus maintenance and operating facilities and supporting programs such as rideshare, ridematching, enforcement "Hot lines," or public awareness.

Estimation of costs is site specific; no discreet model can be defined which can be uniformly applied to determine operating costs. Operating and maintenance costs for an HOV facility are best determine by a site specific procedure.

## 6.3 COST ESTIMATING PROCEDURE

For the I-66 corridor, operating costs will be developed as a percentage of current total costs for freeway maintenance and operations. Any additional items required solely for access control or traffic flow monitoring of the HOV will be estimated based on similar operations in Minneapolis and Norfolk. Costs for maintenance of parking lots will be based on current area averages per parking space.

DRAFT

# CAPITAL COST METHODOLOGY REPORT

for the

I-66 Corridor
Major Investment Study

Prepared for

Virginia Department of Rail and Public Transportation

in cooperation with

Federal Transit Administration
Federal Highway Administration
Arlington County
Fairfax County
Fauquier County
Loudoun County
Prince WilliamCounty
City of Fairfax
Washington Metropolitan Area Transit Authority
Virginia Railway Express
Northern Virginia Transportation Commission
Potomac and Rappahannock Transportation Commission
Metropolitan Washington Airports Authority
NCR Transportation Planning Board

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# SECTION 1 - INTRODUCTION

## PURPOSE OF REPORT

The purpose of this report is to outline the basis for preparing the capital cost estimates for the I-66 Corridor Major Investment Study. This methodology report will specify the procedures, estimating categories, units and unit prices to be used in the preparation of system-wide capital costs, which will be compiled into capital cost estimates for each of the alternatives under consideration. The capital cost estimates will be used in evaluating the cost-effectiveness of the alternatives and provide information for the financial analysis report.

The report will be used to provide cost information in a comparative manner to provide a basis for the selection of a preferred alternative in addition to the preparation of required environmental documentation and for advancement of the selected alternative into the preliminary engineering phase.

Modification to these estimates will be made, as necessary, to reflect the levels of information available as the project is developed. Although this is an MIS, the methodology will also generally follow the Federal Transit Administration (FTA) guidelines for an AA/DEIS. Cost estimates will be prepared in 1995 dollars and will reflect the total project costs including right-of-way acquisition, site preparation, facilities construction, vehicles, purchase and installation of system-wide facilities and equipment, restoration of adjacent infrastructure, engineering and design, construction management, owner administration, taxes and contractor bonding, contingencies, and special condition costs.

## PROJECT DESCRIPTION

The I-66 Major Investment Study encompasses the I-66, US 29 and US 50 routes extending west from Capital Beltway (I-495) to Chantilly, Haymarket and Manassas. This MIS will define and evaluate highway and transit alternatives, including bus system improvements, light rail transit (LRT), Metrorail, commuter rail (VRE), and HOV. The MIS study is intended to provide a framework of transportation improvements which may include a single or combination of the study alternatives.

## ALTERNATIVES DESCRIPTION

The conceptual alternatives for the project are being developed simultaneously with this Capital Cost Methodology Report. In general, all alternatives will be based on the following categories:

- No Build
- General Highway Improvements
- HOV Lanes and Facilities
- TDM/TSM/Transit Improvments
- LRT/Metrorail Services
- VRE Services

## COST CATEGORIES

The capital cost for each alternative comprises costs from each of the following major categories to the extent required by the definition of the alternative. The major capital cost categories for each build alternative and technologies to be studied are:

- Guideway
- Surface Facilities (including parking and fare structures)
- Roadway Modifications (including bridge modifications)
- Trackwork
- Traction Power
- Signals and Automatic Train Control
- Communication
- Passenger Stations
- Fare Vending
- Vehicles
- Related Facilities (maintenance, operations)
- Contingencies and add-on allowances
- Special Conditions
- Right-of-Way

Guideway. The guideway consists of elevated structures, at-grade construction, depressed and/or underground construction. The cost estimate is based on parametric unit costs specifically developed for each construction type, and for varying depths as appropriate.

Surface Facilities. The surface facilities include parking lots, parking structures, bridges, and new roadways. Parking and fare collection structures are also included.

Roadway Modifications. Roadway modification costs include highway and street reconstruction, traffic signal coordination, pedestrian walkways, curbs and gutters, parking outside of park-and-ride lots, and related facilities. This also includes rerouting of public access during construction or mitigation for adverse changes to traffic patterns on adjacent roadways. It also includes the costs associated with any bridge modifications required for transit construction.

Trackwork. Trackwork includes the running rail, ties, ballast, direct fixation track, rail fastening system, rail welding, and special trackwork components such as crossovers and turnouts. The unit costs include both materials procurement and installation. Trackwork also includes winterization costs such as switch and rail heaters.

Traction Power. The traction power distribution system includes costs for a traction power distribution system including structures, transformers, switch gear, ancillary equipment, substations and tie breaker stations. Mainline catenary or third rail is included as appropriate for the alternative.

Signals and Automatic Train Control. The cost of the rail technology will include both train control and signals. The system also involves the signals at special trackwork locations such as junctions and crossovers.

Communication. Costs in this category include facilities such as emergency phones, closed-circuit televisions, public address systems, wayside facilities, and radio facilities. This category also covers the costs (if required) for automatic vehicle location (AVL) systems.

Passenger Stations. Station costs include the platforms, patron access facilities, shelters, Americans with Disabilities Act (ADA) access and amenities. A separate parametric unit cost is developed for each station type. Earthwork costs are included in this category.

Fare Vending. Fare vending costs cover the fare collection equipment at rail stations. Cost will be based on the number of stations and projected ridership.

Vehicles. The costs include bus and rail vehicles and any additional maintenance vehicles. Number of vehicles used is based on a projection from the travel demand model, and increased 20 percent for maintenance allowance.

Related Facilities. This category includes new facilities as well as expansion or modifications to existing maintenance centers and operation control centers. This would include vehicle storage yards, vehicle repair and maintenance shops, office support areas, wayside maintenance facilities, control center, surveillance center, surveillance cameras, changeable signs, and offices for security and operating staff.

Contingencies and Add-on Allowances. Contingencies and add-on allowances would cover the conceptual estimating contingency, engineering project management, construction management, insurance, and agency costs.

Special Conditions. Special condition costs are those elements not included in any other capital cost category and are not covered by contingency factors, yet are large enough to be identifiable at this stage of project development. Environmental mitigation and major utility relocation costs are also included as special condition costs if not covered by another cost category such as right-of-way for wetland mitigation. Building demolition and restoration costs are also included in this category. Hazardous material mitigation is another example. However, hazardous material is generally the responsibility of the property owner prior to sale of the property.

Right-of-Way . The right-of-way cost category covers the purchase of property, relocation costs and the issuance of construction and permanent property easements to accommodate the system. Property purchase required for mitigation, such as wetland and noise, is included here.

# SECTION 2 - GENERAL APPROACH

Capital costs will be determined for each alternative, with all costs expressed in 1995 dollars. The total cost developed for each alternative is the result of several intermediate levels of cost estimating. The cost estimate utilizes parametric unit costs, special condition costs, and system-wide costs. The parametric unit costs are based on a conceptual scope appropriately developed for each specific work item. The parametric unit costs are developed by combining the costs of several components applicable to a typical cross-section into one unit cost. Special condition unit costs will be developed based on a conceptual design relating to the unique circumstances. System-wide elements are those necessary for operation, but whose costs cannot be allocated to an individual geographic section (e.g., vehicles, maintenance center, control center.)

Once the unit costs or special condition costs have been determined, they are subject to several allowances and add-on factors. Most unit costs contain "internal" allowances to cover generic costs that have not been quantified. For example, percentages will be assigned to the following unit guideway costs:

- Miscellaneous sitework
- Minor utilities
- Mobilization and demobilization and general conditions
- Maintenance-of-traffic

These allowances are referred to as internal allowances because they are included in the parametric unit costs and found only in the unit price development backup. Additional "external" allowances cover engineering, management, insurance and the conceptual estimate contingency. These factors are referred to as add-on factors because they are added to the unit cost and appear in some of the cost tables as a separate cost category. The I-66 Corridor MIS cost-estimating methodology will use both internal allowances and add-on factors.

After the cost data is developed, it is put into a cost stream format based upon the stationing of the alignments or distance between common points. This format directly relates the cost to the conceptual plans and assists in summarizing costs, and in the analysis of full length or mix and match alternatives.

## UNIT COST DEVELOPMENT

Capital costs are developed for each alternative by utilizing parametric unit costs, special condition costs, and system-wide costs in conjunction with quantity take-offs and calculations.

Typical facility costs will be calculated based on parametric unit costs and the applicable quantities. Typical facilities are portions of the system which can be assigned costs at a fairly aggregate level with an acceptable level of accuracy. These facilities include line segments of each alternative than can be represented by typical cross-sections, and those items that can be discretely identified and quantified. An additional design element which lends itself to the parametric unit costs approach is a simple, typical transit station. Typical cross sections will be provided in for each alternative and will be detailed in appendices to the capital cost report.

## APPLICATION OF UNIT COSTS

For the capital cost estimating process alignment alternatives will be disaggregated into sections which contain a beginning and end node. Each section will be defined as the segment between two nodes. The cost of a section is computed by multiplying its length by the applicable parametric unit cost and adding special condition

costs. The costs for each section of an alternative are summed. System-wide costs, contingencies, and add-on allowances will then be added to determine the total project cost estimate for a section.

This process simplifies and reduces the effort required to produce concept-level estimates by consolidating many of the cost components into a typical section.

## SOURCES OF DATA

This approach primarily builds on the detailed cost estimates and construction experience of local transit agencies. Bus, LRT, Metrorail, VRE and HOV unit costs will be based on recent cost estimates and construction bids prepared for other local or regional procurements and construction projects for light rail in Baltimore, Portland, Denver, and Saint Louis. All costs will be in 1995 dollars.

## DATA MANAGEMENT

The preparation of cost estimates involves a sizeable database of cost information. Avoidance of clerical/ mathematical errors requires procedures that enable a thorough review and cross checking of the cost data.

## COST ESTIMATE LEVELS

Experience has shown that various displays of cost estimate data are necessary to respond to different questions and interests.

Three levels (or consolidations) of estimates will be utilized along with the flow of cost data that will be available. The three levels of estimates provide an efficient and logical flow of cost data to the summary level (Level 1). The estimating process originates with Level 3 Cost Estimates which are used to develop Level 2 and Level 1 Cost Estimates.

Level 3 Cost Estimates are developed for each cost category in each alternative and are tabulated for each section applicable to the specific alternative.

Level 2 Cost Estimates are tabulated in two formats. First, section costs (categorical costs excluding system-wide costs) are displayed for each alternative. Secondly, section costs for each technology alternative are displayed for each section allowing a visual comparison of costs based on technology.

The total capital cost for each alternative will be summarized in a Level 1 format. Detail will be provided in a corresponding appendix.

## CONTROL OF POTENTIAL COST VARIANCES

Alignments will be reviewed for unique items and unusual site conditions that would impact the cost estimates. These costs will be added as stipulated items.

## ANNUALIZED COST FACTORS

The annualized capital cost is used to evaluate the cost effectiveness of an alternative. The useful life of a particular type of construction, equipment, or service is an important factor in determining the annualized costs. Table 2.1 contains a list of the various cost categories and their respective useful lifetime and annualization factors. The annualization factors determined by the Federal Transit Administration (FTA) are based on a federally required (Office of Management and Budget) percent discount rate.

**Table 2.1**
**ANNUALIZATION FACTORS APPLIED TO CAPITAL COST ELEMENTS**

| Element | Lifetime (Years) | Annualization Factor |
|---|---|---|
| Bus and Light Rail Guideway | 30 | .106 |
| Maintenance Center/OCC | 30 | .106 |
| Special Conditions | 30 | .106 |
| Roadway Modifications | 20 | .118 |
| Passenger Stations | 30 | .106 |
| Trackwork | 30 | .106 |
| Light Rail Vehicles | 25 | .110 |
| Bus Vehicles | 12 | .147 |
| Signals and ATC | 30 | .106 |
| Communications and Security | 30 | .106 |
| Fare Vending | 25 | .110 |
| Traction Power | 30 | .106 |
| Right-of-Way | 100 | .100 |

Source: Federal Transit Administration

# SECTION 3 - COMMON ITEM UNIT COSTS

The following items are common to the installation of any guideway alternative and are estimated using the most reliable method.

## ALREADY-INCLUDED UNIT COSTS

Three earthwork categories are integrated into the estimating process and, subsequently, are not estimated separately.

- Mass Excavation - The cost of earthwork necessary to grade and prepare the site for construction.
- Structural Excavation - Includes the cost of removal of any structural elements necessary to prepare the site or alignment for construction.
- Backfill - Includes the cost of any fill necessary for site preparation.

## ADDITIONAL UNIT COSTS

- Retaining Walls - Includes the cost of constructing walls for slope stabilization, structural support, etc. Typically walls are assumed to be 10 feet high:

  - Retaining wall
  - Retaining wall with O piling
  - Retaining wall with H piling

- Utilities - Includes the estimated cost of any normal utility adjustments, special treatment of existing utilities and the cost of any utility relocation. Specific costs have been averaged on a per mile basis from estimates and construction experience by the local transit agencies.
- Culverts - Includes the cost of modifying or extending major culverts. The need for and extent of modification is based upon field inspection and conceptual calculations. Cost is site specific.
- Right-of-Way - Estimates for each alternative are based on a characterization of the land adjacent to each alternative. Present land value and assessments will be verified. A cost per-square-foot of land in each subarea will be developed and used to calculate right-of-way costs. A mean value for each area will be established. This mean value will be expressed as either the total value per-square-foot which applied to the highest and best use for land with development potential, or as land value per-square-foot which will include the cost of the land only in areas where there is little or no development potential.
- Relocation Costs - Relocation costs for the project are not anticipated to be significant and are, therefore, not included as a separate cost item. Any relocation costs would be added to right-of-way costs.
- Landscaping - Average landscaping costs for LRT stations will be based on Baltimore MTA and Cleveland RTA experience. Cost for Metrorail and VRE stations will be based on previous expenditures. Costs will be developed for each transit mode and station type as follows:

Station without Park-and-Ride
Station with Park-and-Ride

- Formalization of Bus Stops - As necessary, bus stop locations will be formalized and upgraded. The unit cost will includes a bus shelter (structure, signage, lighting, bench and trash receptacle), and concrete apron adjacent to the shelter.

## ADD-ON COSTS

In addition to the construction costs of each transit mode, "add on" costs will be estimated, generally as a percentage of construction costs as follows:

Contingency - Applied to the line item costs at a variable percentage rate according to the degree of uncertainty present. The contingency can be item specific and be based on a number of factors:

1) Level of detail of alignments and profiles
2) Level of uncertainty of type of construction
3) Level of uncertainty of alignment
4) Difficulty of design and construction

At the conceptual project stage, a conceptual estimating contingency is applied to the categorical costs on a line-item basis. This amount accounts for the confidence level in the quantity evaluation during the initial design, and also provides for unforeseen and unidentified circumstances specific to the project definition. Generally, this percentage is reduced as the project progresses through the various stages of design. The conceptual estimating contingency may be increased for specific cost categories in a section to reflect unique site conditions or additional uncertainties that might be expected to occur.

## PROJECT INSURANCE

Project Insurance includes all premium costs to provide "wrap-up" insurance coverage. This includes Professional Liability, Comprehensive General Liability, Builder's Risk, Worker's Compensation and Employer's Liability Insurance, Construction Equipment Loss or Damage, and Automobile Insurance.

For the preparation of the total cost estimates for I-66 MIS Study, an set percent insurance allowance will be applied to the basic construction costs to cover the expense of project insurance. This percentage is applied to the civil/structural, trackwork, and system baseline cost estimates. A contingency for project insurance will not be applied to the cost for right-of-way or buses.

Wrap-up insurance costs have risen significantly in recent years. The number of claims filed against this type of insurance in 1990 doubled as compared to the number of claims filed in 1987. Recent project experience in Atlanta, Baltimore, and Dallas indicates that the cost of wrap-up insurance varies from 2 to 8 percent. A review of background data for projects in the region will be conducted to determine a reasonable, conservative percentage for estimating project insurance.

## ENGINEERING, PROJECT MANAGEMENT AND CONSTRUCTION MANAGEMENT

The costs for engineering project management and construction management are prepared by assessing the labor requirements at each stage of project development. Also included are the costs of document printing and

publishing, travel costs, bid evaluations, office expenses, and handling costs for claims and changes initiated during construction. The engineering and management contingency allowance will be the same for all elements except systems work, trackwork, right-of-way, rail vehicles, fare vending, and buses.

## AGENCY COSTS

The agency cost includes the owner's project administrative overhead and supervision during the design and construction stages. It is applied as a percentage of the total estimated cost, including contingency costs. This percentage will be based on experience with other projects.

# SECTION 4 - RAIL UNIT COSTS

Rail unit costs have been developed so that each cost item or unit is an independent module of construction and does not include the cost of other significant items averaged into the unit cost. For example, a linear foot of double-box cut-and-cover does not include any portion of vent and fan shafts or stations, although for any significant length of double box line, these elements would occur and therefore could be averaged into a cost per linear foot. Instead, each significant component of the system has been separately identified and a cost defined. This greatly increases the accuracy of the system costs although it does require estimators to identify the significant separate items so that all costs are included in the total.

Table 4.1 shows unit costs for alternative rail components. The prices are current (1995) construction contract average expected bid prices and do not include right-of-way acquisition, engineering, site preparation (demolition), utilities or landscaping which are estimated separately. Earthworks (excavation and backfill) are included in unit costs because they are an integral unit in the estimating procedure. The Open Cut, Retained Cut, Open Fill and Retained Fill categories show 10-foot and 20-foot average depth of cut or fill as representative costs for these categories. Additional unit costs will be calculated during conceptual engineering as the need arises.

These generalized unit costs will be applied for Metrorail, light rail, and VRE commuter rail capital cost estimates.

TABLE 4.1
UNIT COSTS FOR RAIL

| Line | Description | Unit | LRT Cost ($) 1995 |
|---|---|---|---|
| | **TRACKWORK:** | | |
| 1 | Ballasted Track | TF | (TBD) |
| 2 | Direct Fixation Track | TF | (TBD) |
| 3 | Special Trackwork: | | (TBD) |
| 3a | Ballasted Double Crossover #10 | EA | (TBD) |
| 3b | Direct Fixation Double Crossover #10 | EA | (TBD) |
| 3c | Ballasted Turnout #10 | EA | (TBD) |
| 3d | Direct Fixation Double Crossover #8 | EA | (TBD) |
| 3e | Direct Fixation Turnout #8 | EA | (TBD) |
| 3f | Direct Fixation Turnout #6 | EA | (TBD) |
| | **TRACTION POWER:** | | |
| 4 | Traction Power Substation | EA | (TBD) |
| 5 | Traction Power Tie Breaker | EA | (TBD) |
| 6 | Traction Power (third) Rail | TF | (TBD) |
| | **GUIDEWAY:** | | |
| 7 | Aerial Structure - single columns | LF | (TBD) |
| 8 | Aerial Structure - separate columns | LF | (TBD) |
| 9 | Aerial Structure for #10 Crossover | LF | (TBD) |
| 10 | Cut-and-Cover In-Sheet | LF | (TBD) |
| 11 | Cut-and-Cover Off-Street | LF | (TBD) |
| 12 | At-Grade Ballasted | LF | (TBD) |
| 13 | Embankment Section 10' | LF | (TBD) |
| 14 | Embankment Section 20' | LF | (TBD) |
| 15 | Open-Cut Section 10' Depth | LF | (TBD) |
| 16 | Open-Cut Section 20' Depth | LF | (TBD) |
| 17 | Open-Cut Section 30' Depth | LF | (TBD) |
| 18 | Retained Cut Section - 10' height of wall | LF | (TBD) |
| 19 | Retained Cut Section - 20' height of wall | LF | (TBD) |
| 20 | Retained Cut Section - 30' height of wall | LF | (TBD) |

TABLE 4.1
UNIT COSTS FOR RAIL (cont'd)

| Line | Description | Unit | LRT Cost ($) 1995 |
|---|---|---|---|
| 21 | Retained Fill Section - 10' height of wall | LF | (TBD) |
| 22 | Retained Fill Section - 20' height of wall | LF | (TBD) |
| 23 | Portal Structure | EA | (TBD) |
| 24 | Pumping Station | EA | (TBD) |
| 25 | Vent Shaft | EA | (TBD) |
| | PASSENGER STATIONS: | | |
| 26 | Std. At-Grade Sta., Center Platform* | EA | (TBD) |
| 27 | Std. At-Grade Station, Side Platform* | EA | (TBD) |
| 28 | Std. Aerial Station, Center Platform* | EA | (TBD) |
| 29 | Std. Aerial Section, Side Platform* | EA | (TBD) |
| | ROADWAY MODIFICATIONS: | | |
| 30 | Grade Crossing/Gates | EA | (TBD) |
| | SIGNAL AND AUTOMATIC TRAIN CONTROL: | | |
| 31 | Train Control System - Passenger Station | EA | (TBD) |
| 32 | Train Control System - Line | TF | (TBD) |
| 33 | Train Control System - Double Crossover | EA | (TBD) |
| 34 | Communication System - Passenger Station | EA | (TBD) |
| 35 | Communication System - Line | TF | (TBD) |
| | RIGHT-OF-WAY: | | |
| 36 | Right-of-Way | LS | (TBD) |
| | FARE VENDING: | | |
| 37 | Fare Vending Equipment | EA | (TBD) |
| | VEHICLES: | | |
| 38 | Passenger Vehicle | EA | (TBD) |
| 39 | Related Facilities (Maintenance and Operation) Yard and Shop | LS | (TBD) |
| 40 | Locomotives | EA | (TBD) |

## TABLE 4.1
## UNIT COSTS FOR RAIL (cont'd)

| Line | Description | Unit | LRT Cost ($) 1995 |
|---|---|---|---|
| | **CONTINGENCIES AND ADD-ON ALLOWANCE:** | | **(TBD)** |
| | **SPECIAL CONDITIONS:** | | **(TBD)** |
| 40 | Utilities | | Stipulated |
| 41 | Culverts | | Stipulated |
| 42 | Landscaping | | Stipulated |
| 43 | Station w/o Park-and-Ride | EA | (TBD) |
| 44 | Station w/Park-and-Ride | SPACE | (TBD) |
| 45 | Acoustical Barrier Wall | LF | (TBD) |

* Station design specifications vary according to rail mode.

- Track - Ballasted - Includes ballast, ties, continuous welded 115 pound rail, and Other Track Materials (OTM).
- Track - Direct Fixation - Includes grout pads, fasteners, continuous welded 115 pound rail, and OTM.
- No. 10 Double Crossover - Ballasted - Includes ballast, ties, frogs, switches, rails, plates, and OTM, at 14-foot track centers.
- No. 10 Double Crossover - Direct Fixation - Includes grout pads, fasteners, rubber pads, frogs, switches, rails, plates and OTM, at 14-foot track centers.
- Traction Power Substation - Includes structure, transformers, switch gear, ancillary equipment, one story building constructed at grade. One substation is needed per mile.
- Traction Power Tie Breaker - Includes structure, switch gear and ancillary equipment, constructed at grade. One tie breaker is needed per mile.
- Traction Power (third) Rail - Includes insulators, rail coverboard, negative cross bonding, and miscellaneous cable connections.
- Aerial Structure - Double Track - Includes pile foundation, 14-foot track centers, reinforced concrete.
- Aerial Structure - Double Track - Includes pile foundation. Each track on separate column, variable centers.
- Aerial Structure for No. 10 Double Crossover - At 14-foot track centers.

- Cut-and-Cover - Double Track, Double Box Structure - Includes excavation, support of excavation, decking, reinforced concrete structure, electrical and mechanical finish work, backfill and restoration of paving, for 14-foot track centers, in-street construction, with 30 feet average depth to invert.

- Cut-and-Cover - Double Track, Double Box Structure - As above except off-street construction. Does not include decking or paving work.

- Open Cut - Double Track - Includes excavation, trackbed subgrade, drainage, fencing, for 14-foot track centers, with an average depth-of-cut of 10 feet.

- Retained Cut - Double Track - Includes excavation, reinforced concrete walls, trackbed subgrade, drainage and fencing, for 14-foot track centers, with an average height of wall of 10 feet.

- Open Fill - Double Track - Includes embankment, trackbed subgrade, drainage and fencing, for 14-foot track centers, with an average depth of embankment of 10 feet.

- Retained Fill - Double Track - Includes reinforced concrete walls, fill, trackbed subgrade, drainage and fencing, for 14-foot track centers, with an average height of wall of 10 feet.

- Portal Structure - Retained Cut, Double Track - Includes excavation, concrete invert for tracks, drainage, fencing, for 14-foot track centers, with a depth of portal of 20 feet of reinforced concrete.

- Pumping Station - Includes structure, pumps, and ancillary equipment, using cut-and-cover construction.

- Vent Shaft - Includes structure, two outlets at surface, dampers and ancillary equipment, using cut-and-cover construction, with a depth of 30 feet. Capacity: 100,000 cubic feet minute. Two vent shafts per station; one additional in long tunnel sections.

- Station - At Grade/Open Cut, Double Track - For Metrorail, includes 600-foot-long side platforms with reinforced concrete retaining walls and canopy, architectural finishes, elevators, escalators, light, power, fare collection, kiosk, furniture, signage, with an average depth of cut of 10 feet. For LRT, 300-foot platforms are assumed for 3-car trains. For VRE commuter rail, 400-foot platforms that could be expanded to 800 feet are assumed.

- Station - Aerial, Double Track for Metrorail - Includes side platforms, prestressed concrete structure with canopy, architectural finishes, elevators, escalators, light, power, fare collection, kiosk, furniture, signage.

- Station - Aerial, Double Track - Same as above except with center platform.

- Train Control System - for passenger station.

- Train Control System - for line.

- Train Control System - for double crossover.

- Communication System - for passenger station.

- Communication System - for line.

- Yard and Shop - will be estimated as a stipulated item under Related Facilities.

- Passenger Vehicle ( **Need to Determine Car Type** ) - A (TBD) percent spare ratio will be used for determining vehicle requirements. Metrorail and VRE vehicles would be compatible with those currently operating. LRT vehicles are based on overhead catenary electrification with manual controls and communications.

# SECTION 5 - ROADWAY UNIT COSTS

Roadway unit costs have been developed in a manner similar to that for rail. Each cost item or unit is an independent module of construction and does not include the cost of other significant items averaged into the unit cost. Costs are estimated unit costs for specific roadway sections. Costs for special segments, including structures, will be estimated based on more detailed engineering drawings.

Table 5.1 shows unit costs for the roadway components. Recent local cost data is available on a wide range of unit cost items neded for roadway improvements related to corridor improvement options. Unit cost elements shown in Table 5.1 are appropriate for implementation of HOV lanes, rail grade crossings, and structures for special roadway ramps.

## TABLE 5.1
## UNIT COSTS FOR ROADWAY CONSTRUCTION

| Line | Description | Unit | LRT Cost ($) 1995 |
|---|---|---|---|
| | **ROADWAY MODIFICATION:** | | |
| 1 | Fill Construction | CY | (TBD) |
| 2 | Excavation | CY | (TBD) |
| 3 | Preparation | SY | (TBD) |
| 4 | Obliterate lane striping | LF | (TBD) |
| 5 | Asphalt Concrete Shoulder | TON | (TBD) |
| 6 | Asphalt Concrete Curb & Gutter | LF | (TBD) |
| 7 | PCC pavement | CY | (TBD) |
| 8 | Concrete barrier | LF | (TBD) |
| 9 | Drainage pipe | LF | (TBD) |
| | **TRAFFIC CONTROL:** | | |
| 10 | Construction traffic signage/control | EA | (TBD) |
| 11 | Signalization | EA | (TBD) |
| | **STRUCTURES:** | | |
| 12 | Railing | LF | (TBD) |
| 13 | Piles | LF | (TBD) |
| 14 | Column | LF | (TBD) |
| 15 | Aerial structure | LF | (TBD) |
| | **PASSENGER STATIONS/PARKING:** | | |
| 16 | Transit center | EA | (TBD) |
| 17 | Parking | SPACE | (TBD) |
| | **RIGHT-OF-WAY:** | | |
| 18 | Right-of-Way | LS | (TBD) |
| | **FARE VENDING:** | | |
| 19 | Fare Vending Equipment | EA | (TBD) |
| | **VEHICLES:** | | |
| 20 | Passenger Vehicle | EA | (TBD) |
| | Related Facilities (Maintenance and Operation) Yard and Shop | LS | (TBD) |
| | **MISCELLANEOUS** | | |

TABLE 5.1
UNIT COSTS FOR ROADWAY CONSTRUCTION (cont'd)

| Line | Description | Unit | LRT Cost ($) 1995 |
|---|---|---|---|
| 21 | Pedestrian Bridge | LF | (TBD) |
| 22 | Elevators | LF | (TBD) |
| 23 | Lighting | LF | (TBD) |
| | CONTINGENCIES AND ADD-ON ALLOWANCE: | | (TBD) |
| | SPECIAL CONDITIONS: | | (TBD) |
| 24 | Utilities | | Stipulated |
| 25 | Culverts | | Stipulated |
| 26 | Landscaping | | Stipulated |
| 27 | Station w/o Park-and-Ride | EA | (TBD) |
| 28 | Station w/Park-and-Ride | SPACE | (TBD) |
| 29 | Acoustical Barrier Wall | LF | (TBD) |

DRAFT

# METHODOLOGY REPORT

# FOR

# PUBLIC PARTICIPATION

for the

**I-66 MAJOR INVESTMENT STUDY**

prepared for the

**Commonwealth of Virginia**

**Department of Rail and Public Transportation**

**and**

**Department of Transportation**


Prepared by

Mary Means Associates

and

BRW, Inc.


September 15, 1995

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# I. OBJECTIVES OF THE PUBLIC PARTICIPATION PROGRAM

Opportunities for public participation will be provided throughout the I-66 Corridor Major Investment Study (MIS) and at key decision points. Throughout the public participation program, the Virginia Department of Rail and Public Transportation (VDRPT) and the Virginia Department of Transportation (VDOT) will work to ensure that each step of the I-66 MIS includes extensive public input. The goal is to ensure that all issues of concern are addressed, and that the results of all studies are presented to the general public, interested groups, and government agencies before decisions are made. Public involvement activities will be scheduled so as to ensure timely consideration of public input with respect to the technical work.

The program for public participation will address several kinds of audiences, including:

- the general public,
- residents and businesses in the Corridor
- elected and appointed representatives, and
- government agencies.

VDRPT and VDOT's public participation objectives are to:

- disseminate information about the study to the general community and to directly affected communities;
- obtain full continuous open and fair public participation throughout the entire program;
- respond to local desires and federal MIS requirements for public participation;
- develop a program for participation which is acceptable to the public and provides mechanisms for development of a community consensus on the preferred transportation investment strategy;
- enable these parties to assist in the development and verification of findings;
- ensure that public and private concerns on issues such as environmental quality and safety are heard and incorporated into the project planning as appropriate.

The public participation program is designed so that all interested parties are able to participate in the Study. It is intended to encourage and provide ample opportunities for an open exchange of ideas and views.

## II. PRINCIPLES AND POLICIES OF PUBLIC INVOLVEMENT

The ongoing involvement of the public, local government and other interested groups will be crucial to the successful completion of the I-66 Corridor MIS. Several principles guide the public participation process. They are intended to enhance the effectiveness of public participation activities and promote maximum community involvement.

- The Study team will be objective in presenting the range of transportation options that are possible.
- Efforts will be made to identify and reach a diversity of persons and groups interested in or potentially affected by the I-66 Corridor MIS.
- Citizen participation will be solicited at the beginning of the Study and will be encouraged throughout the process.
- Efforts to solicit community views will be intensified prior to major decision points.
- The public will have access to all relevant information.
- Study status and findings will be reported regularly to the public in newsletters and other media using language geared to lay persons.
- Introductory orientation material will be provided throughout the Study to accommodate new participants who may enter in later stages of the project.
- The process will be "two-way", with the Study team, community residents and other study participants freely exchanging information and ideas.
- All reasonable and promising suggestions by the community will be given serious consideration by the Study team.
- Citizen inquiries will be followed up promptly with answers and information.
- All community participation activities and input will be documented and distributed to key members of the Study team, VDRPT and VDOT.
- Public meetings will be informational and will use the best available techniques to solicit citizen input.

These principles have been used to design the program described in this document. They also will be used to revise the program as the Study proceeds and to formulate response to comments received through the various public participation activities.

## III. ACTIVITIES AND AUDIENCES

As previously stated, VDRPT and VDOT's public participation program will make every effort possible to engage the general public. Understanding the target audience is critical to the development and implementation of a successful public information program.

The public participation program includes several different elements. Each element is targeted to specific audiences. These elements will include:

- Establishment and maintenance of a project mailing list and distribution of a project newsletter during major project phases.
- Development and distribution of a general project brochure.
- Meetings with project stakeholders including officials, business and civic leaders, community groups and business associations, governing boards and governmental agencies.
- Formal meetings with the project Technical Advisory Committee (TAC).
- Public workshops and information meetings.
- Establishment of a toll-free hot line that can be used to obtain project information.

All inputs will be considered in assessing effects, evaluating alternatives and making decisions. Public or interest group input used in the Study, and how it was used will be discussed at community meetings and in the newsletters.

All input received during the public participation program will be carefully logged, summarized and stored for future reference. Such documentation will include the summary of comments at meetings and other events, comment sheets, and the telephone response line. Summaries of public input will be distributed in a timely manner to study team member, administrative staff and other appropriate agencies.

Each element of the public participation program is described in more detail below.

*Newsletters*

Newsletters will be sent to all participants during the study: members of the general public, elected officials, members of the Technical Committee, and staff of participation agencies. The newsletters will be approved by the VDRPT prior to distribution. Four newsletter are scheduled to be produced during the course of the Study. They will be distributed via the mailing list and be placed in public locations such as libraries and government centers. The newsletters will be professional in format and presentation. The objectives of the newsletters are to:

- report the status of the Study;

- describe progress made since the previous newsletter and present current findings;

- provide opportunities for direct public contributions;

- respond to the most frequent questions asked and list the most frequent comments and suggestions received since release of the last newsletter;

- describe how public input has been taken into account;

- announce upcoming public participation opportunities.

*Brochure*

An information brochure will be developed for the project. The brochure will include display graphics describing the purpose of the project, project milestones and opportunities for public participation. The brochure will be drafted with a non-technical diverse public audience in mind. Brochures will be distributed in response to general information requests and will be made available to the public at public meetings.

*Briefings with Stakeholders*

The purpose of interaction with stakeholders and community representatives is to insure a balanced program of public participation with public officials, business representatives and community organizations. Individual and group meetings provide a valuable opportunity to receive additional public input and comment outside of the public information meetings. Individual briefings will be held, as necessary, beginning with a series of "stakeholders" meetings with elected officials, community leaders, business owners, and interest groups prior to the first public meetings. These briefings will help the Study team to develop an understanding of the communities and interests in the Corridor and to understand the potential impact of such alternatives. The briefings will also provide input as to the best means of communication regarding the alternatives. The stakeholders will be asked to provide additional names for the I-66 Corridor MIS mailing list and database.

*Review Committee -- Technical Advisory Committee*

A Technical Advisory Committee has been established to help guide the study to ensure that it addresses the full range of local and regional concerns. This committee will be the primary formal linkage between the Study team and interested agencies.

The Technical Advisory Committee ensures the reliability of the technical methods, assumptions, and results of all work to evaluate the alternatives and their impacts. The TAC also ensures that the Study complies with all procedural requirements of local, State and Federal agencies with jurisdiction over the Corridor, the alternative transportation improvements, or the potential impacts. Committee members receive review drafts of all technical reports and provide comments on the reasonableness of both the approach and the results. The TAC advises VDRPT and VDOT of its findings. The TAC also may make

recommendations to the Study team and VDRPT and VDOT on issues that arise during the Study and on the selection of a Preferred Transportation Investment Strategy (2).

The TAC will consist of representatives of:

- Local jurisdictions: Arlington County, City of Fairfax, Fairfax County, Fauquier County, Loudoun County and Prince William County
- Regional Agencies: Metropolitan Washington Airports Authority, NCR Transportation Planning Board, Northern Virginia Transportation Commission, PRTC, Virginia Railway Express, Washington Metropolitan Area Transit Authority
- Federal Agencies: Federal Highway Administration - Region 3, Federal Highway Division - Virginia Division; Federal Highway Administration - Virginia Division, Federal Transit Administration, Federal Transit Administration - Region 3.

*Public Information Meetings*

Public Information Meetings are held during the Study to:

- identify the concerns and interests of the community
- to communicate findings from the technical work
- to determine public reaction to findings from the technical work; and
- build credibility and support for the conclusions of the Study.

Well in advance of the meeting dates, public information meetings will be announced through the local media and the Study's newsletter. Public notices will be published by VDOT in a variety of local and regional publications designed to reach a large public audience.

- Kick-off Meeting

  One round of up to two meetings will be conducted at various locations in the Study area to describe the purpose of the Study, identify the tentative list of conceptual alternatives, review the screening methodology, and receive public comments.

  The Summary of this meeting will provide a synopsis of the meetings, responses to comments, and consequent changes to the Study's Public Participation Methodology in response to public comments.

- Public Information Meetings

  At least four additional rounds of meetings (two meeting locations) will be held at appropriate points during the Study to provide a general update on progress and findings. The meetings will use presentation followed by an open house format. The format will provide attendees with an overview of

the technical information, and opportunities for questions and answers. After the presentation, the Study team will be stationed at displays to answer and record additional questions and comments from the public. Comment sheets will be available to allow participants to record their comments or concerns prior to leaving the meeting or to return them by mail subsequent to the meeting. A Meeting Summary will be prepared after each set of meetings, summarizing the meeting and comments received.

All meeting locations will comply with the American with Disabilities Act (ADA) requirements. Auxiliary aids such as signing for the deaf may be requested up to four days in advance of the meeting by calling or writing VDRPT/VDOT at the address listed in the newsletter and on the public notices.

*Telephone Response Line*

An automated telephone "hot line" will be established for the duration of the Study. The line will be staffed during the weekday working hours and at all other times will accept recorded messages, seven days a week, 24 hours a day. Anyone who has a questions or who would like to make a comment or suggestion can call at any time. Messages and calls will be reviewed, entered into the database and given to appropriate members of the Study team and VDRPT and VDOT for immediate action. Periodic review and summary of the responses will be discussed with the Technical Committee, at community meetings, and in Study publications.

## IV. PROGRAM ACTIVITIES

Program activities are designed to provide a dialog between the Study team and the general public, government agencies and officials as well as civic and business associations in the Study area. Program activities will support each phase of the Study. Program activities are discussed by phase.

***Phase 1. Project Initiation***

A Public Participation Methodology will be developed during this phase of the Study. The Methodology will describe the objectives of the public participation program, the principles and policies of public participation, and the activities and audiences. Briefings with community representatives will be conducted. Some of the ongoing activities will also be initiated, including the Technical Advisory Committee meetings, the 1.800. Hot Line and development of the database for the mailing list.

Objectives:

- To provide an early opportunity for meaningful input from community representatives prior to the general public review of the Public Participation Program
- To develop a Public Participation Program that will address the needs of the I-66 Corridor Major Investment Study area and meet the requirements of ISTEA
- Provide ongoing documentation of the process

Implementation:

The Public Participation Methodology Report will be developed based on past experience with the other public involvement programs in the Study area, and input from the community representatives, and the Technical Committee. The report will be subject to change based on continuing public comment.

VDRPT, VDOT and the Study team will brief key community representatives. These briefings will provide a general project overview and solicit information regarding preferred avenues of information sharing. The representatives also will be asked to provide additional names for the mailing list. Up to 20 key community representatives will be selected for such briefings.

The Technical Advisory Committee will begin their meetings to review the technical reports as they are completed and to review the overall progress of the Study.

Throughout the project a mailing list data base and a citizen comment record will be maintained. The documentation will be continuously updated based on the results of each activities as they are implemented.

The telephone response line will be activated during this phase. During the normal business hours a staff person will answer the phone; at other times

messages will be recorded. All calls will receive a response. All calls will be included in the record of information.

Schedule of formal activities during Phase 1 will include:

- meetings of the Technical Advisory Committee
- briefings of local and regional agency representatives
- briefings of elected officials in affected jurisdictions

After each meeting the Study team and VDRTP staff will prepare a record of the meeting and prepare responses as appropriate.

Phase 1. Products:

- Public Participation Methodology Report. A draft Public Participation Methodology Report will be prepared for review by the Technical Advisory Committee. A revised report will be prepared prior to the kick-off meetings for public review. The Report will be revised as necessary during the course of the Study.

- Mailing list database This will be an ongoing product throughout the Study process. The database will be updated weekly or more often, if necessary. The database will be used to generate the mailing list for newsletters, meetings notices and other materials.

*Phase 2. Development of Conceptual Alternatives*

A round of public workshops (maximum two) will be conducted to describe the purpose of the Study, identify the fifteen (15) conceptual alternatives and proposed screening methodology and to increase public awareness of the Study.

Objectives:

- To identify issues and concerns of community members and stakeholders likely to be affected by the project

- To revise and refine the Methodology Report and conceptual alternatives

- To provide the opportunity for the public to become involved in the Study process

Implementation:

VDRPT, VDOT and the Study team will publish and distribute the first newsletter to announce the kick-off meetings, discuss the MIS process and public participation program, and identify the preliminary conceptual alternatives. This should ensure that participants have a reasonable knowledge base regarding the Study. Comment sheets will be distributed at the meetings.

VDRPT and VDOT will prepare press releases for publication in local newspapers and to be broadcast as public service announcements by local radio stations to

maximize public awareness of the meetings. All media interaction will be reviewed, approved by and coordinated through VDRPT and VDOT.

The kick-off meetings will be held at two different locations on different days to allow for a diversity of participants from the community. After each meeting the Study team will examine all inputs provided at the meetings, and, where appropriate, prepare responses for later discussion and distribution.

Schedule of formal activities during Phase 2 will include:

- meetings of the Technical Advisory Committee
- continued briefings of local and regional agency representatives
- continued briefings of elected officials in affected jurisdictions
- one set of two public workshops designed for the general public

After each meeting the Study team will prepare a record of the meeting and prepare responses as appropriate.

Phase 2. Products

- Newsletter - Approximately 2,500 newsletters will be prepared and distributed during this Study phase.

- Comment Sheets - These will be prepared for use as handouts at the meetings.

- Press Releases/Public Service Announcements - Public notices and press releases will be prepared by VDRPT and VDOT as necessary. All media interaction will be reviewed, approved and coordinated through VDRPT and VDOT.

- Database additions - New information, including names recorded at meetings and the telephone response line, will be put in the database.

- Meeting summaries - A summary of meetings will be maintained in the citizen comment record.

*Phase 3. Detailed Analysis of Alternatives*

A round of meetings (maximum two) will be conducted to present the results of the analysis of the alternatives, any modifications to the Public Participation Methodology suggested during Phase 2. Program activities during this phase will continue to actively engage all interested audiences in the corridor.

Objectives:

To incorporate the input of as many participator groups as possible to refine the prospective list of acceptable alternatives that will be studied and the technical methods that will be used.

- To continue to provide the opportunity for the public to become involved in the Study process

Implementation:

VDRPT, VDOT and the Study team will publish and distribute the second newsletter prior to the screening and technical review phase. This should ensure that participants have a reasonable knowledge base regarding the analysis. Comment sheets will be distributed at the meetings.

VDRPT and VDOT will prepare press releases for publication in local newspapers and to be broadcast as public service announcements by local radio stations to maximize public awareness of the meetings. All media interaction will be reviewed, approved by and coordinated through VDRPT and VDOT.

The meetings will be held at up to two different locations on different days to allow for a diversity of participants from the community. After each meeting the Study team will examine all inputs provided at the meetings, and, where appropriate, prepare responses for later discussion and distribution.

Schedule of formal activities during Phase 3 will include:

- meetings of the Technical Advisory Committee
- continued briefings of local and regional agency representatives
- continued briefings of elected officials in affected jurisdictions
- one set of up to two meetings designed for the general public
- mid-point evaluation of the Public Participation Program

After each meeting the Study team will prepare a record of the meeting and prepare responses as appropriate.

Phase 3. Products

- Newsletter - Approximately 5,000 newsletters will be prepared and distributed during this Study phase.

- Comment Sheets - These will be prepared for use as handouts at the meetings.

- Press Releases/Public Service Announcements - Public notices and press releases will be prepared by VDRPT and VDOT as necessary. All media interaction will be reviewed, approved and coordinated through VDRPT and VDOT.

- Presentation Displays - These will consist of maps of the study corridor and artist's concepts of the alternatives. The displays will be required for each of the public meetings.

- Database additions - New information, including names recorded at meetings and the telephone response line, will be put in the database.

- Meeting summaries - A summary of meetings will be maintained in the citizen comment record.

*Phase 4. Evaluation of Alternatives*

A round of meetings (maximum two) will be conducted to present the results of the evaluation of the alternatives. Program activities during this phase will continue to actively engage all interested audiences in the corridor.

Objectives:

- To evaluate a scaled-down list of alternatives for final consideration.
- To achieve consensus to the extent possible, that the technical approach was performed in a friar and unbiased manner
- To ensure that public and private concerns were incorporated as appropriate

Implementation:

VDRPT, VDOT and the Study team will publish and distribute the third newsletter detailing the outcome of the alternatives phase prior to initiation of evaluation activities. This should ensure that participants have a reasonable knowledge base regarding the analysis. Comment sheets will be distributed at the meetings.

VDRPT and VDOT will prepare press releases for publication in local newspapers and to be broadcast as public service announcements by local radio stations to maximize public awareness of the meetings. All media interaction will be reviewed, approved by and coordinated through VDRPT and VDOT.

The meetings will be held at up to two different locations on different days to allow for a diversity of participants from the community. After each meeting the Study team will examine all inputs provided at the meetings, and, where appropriate, prepare responses for later discussion and distribution.

Schedule of formal activities during Phase 4 will include:

- meetings of the Technical Advisory Committee
- continued briefings of local and regional agency representatives
- continued briefings of elected officials in affected jurisdictions
- one set of up to two meetings designed for the general public

After each meeting the Study team will prepare a record of the meeting and prepare responses as appropriate.

Phase 4. Products

- Newsletter - Approximately 5,000 newsletters will be prepared and distributed during this Study phase.

- Comment Sheets - These will be prepared for use as handouts at the meetings.

- Press Releases/Public Service Announcements - Public notices and press releases will be prepared by VDRPT and VDOT as necessary. All media interaction will be reviewed, approved and coordinated through VDRPT and VDOT.

- Presentation Displays - These will consist of maps of the study corridor and artist's concepts of the alternatives. The displays will be required for each of the public meetings.

- Database additions - New information, including names recorded at meetings and the telephone response line, will be put in the database.

- Meeting summaries - A summary of meetings will be maintained in the citizen comment record.

***Phase 5. Selection of Preferred Alternative(s)***

VDRPT and VDOT will, based on the results of the study and other relevant information, make a recommendation regarding a Preferred Transportation Investment Strategy (s). A round of meetings (maximum two) will be conducted to present the findings regarding the Preferred Strategy(s). VDRPT and VDOT will conduct a workshop for the Commonwealth Transportation Board (CTB) regarding the Study and the Preferred Strategy(s) recommendation. VDRPT and VDOT will submit a final report to the 1997 session of the General Assembly.

Objectives:

- To achieve consensus to the extent possible, that the process has been open and fair and that there is community support for the Preferred Strategy(s) selected at the end of the Study.

Implementation:

VDRPT, VDOT and the Study team will publish and distribute the fourth newsletter reporting on the preliminary findings regarding the Preferred Alternative(s). This should ensure that participants have a reasonable knowledge base regarding the analysis. Comment sheets will be distributed at the meetings.

VDRPT and VDOT will prepare press releases for publication in local newspapers and to be broadcast as public service announcements by local radio stations to maximize public awareness of the meetings. All media interaction will be reviewed, approved by and coordinated through VDRPT and VDOT.

The meetings will be held at up to two different locations on different days to allow for a diversity of participants from the community. After each meeting the Study team will examine all inputs provided at the meetings, and, where appropriate, prepare responses for later discussion and distribution.

Schedule of formal activities during Phase 5 will include:

- one workshop with the CTB
- meetings of the Technical Advisory Committee
- continued briefings of local and regional agency representatives
- continued briefings of elected officials in affected jurisdictions
- one set of up to two meetings designed for the general public

After each meeting the Study team will prepare a record of the meeting and prepare responses as appropriate.

<u>Phase 5. Products</u>

- Newsletter - Approximately 5,000 newsletters will be prepared and distributed during this Study phase.

- Comment Sheets - These will be prepared for use as handouts at the meetings.

- Press Releases/Public Service Announcements - Public notices and press releases will be prepared by VDRPT and VDOT as necessary. All media interaction will be reviewed, approved and coordinated through VDRPT and VDOT.

- Presentation Displays - These will consist of maps of the study corridor and artist's concepts of the proposed preferred alternative(s). The displays will be required for each of the public meetings.

- Database additions - New information, including names recorded at meetings and the telephone response line, will be put in the database.

- Meeting summaries - A summary of meetings will be maintained in the citizen comment record.

- Public comment records will be transmitted as part of the MIS report.

I-66 CORRIDOR Major Investment Study

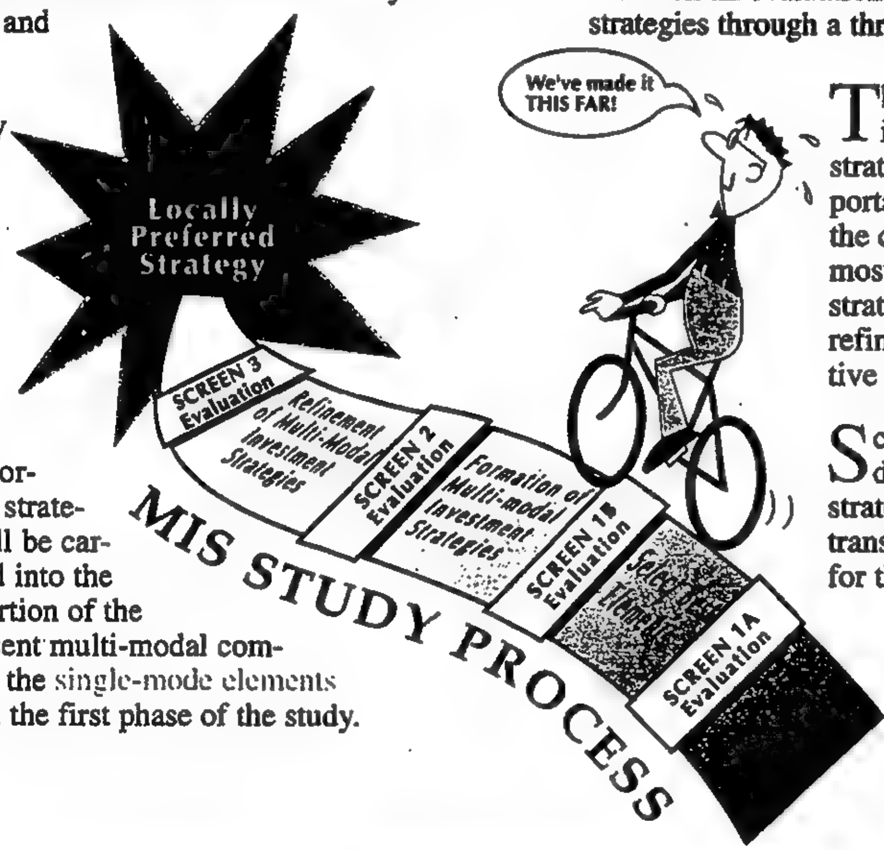
# INFORMER

Issue Three September 1997

## I-66 Study Milestone Reached

A major milestone of the I-66 Corridor Major Investment Study (MIS) has been reached with the selection of multiple transportation modes for review in the next phase of the study. These multi-modal strategies will be evaluated using a variety of modeling tools to determine how well they meet the study goals and objectives.

The study of a particular element or mode does not imply that it will automatically be adopted in any of the corridors. The strategies that will be carried forward into the Screen 2 portion of the study represent multi-modal combinations of the single-mode elements evaluated in the first phase of the study.




The I-66 Corridor MIS is being conducted to identify a preferred transportation investment strategy appropriate to address transportation issues in the corridor over the next 20 to 25 years. The preferred transportation investment strategy will be identified based on an evaluation of alternative transportation strategies through a three-step screening process.

This screening process will identify those elements and strategies that best meet the transportation needs of the corridor. At the conclusion of each screen, the most promising elements and strategies will be modified and refined to ensure that the alternative addresses corridor needs.

Screen 3 will consist of a more detailed evaluation of the strategies to select a preferred transportation investment strategy for the corridor.

## I-66 CORRIDOR GOALS AND OBJECTIVES

### Transportation Service/Mobility

- Accommodate existing and future mobility demands.
- Improve regional access to I-66 Corridor activity centers and improve access from the I-66 Corridor to the region.
- Improve goods movement.

### Environmental Impacts

- Coordinate the transportation improvements to complement existing and future land uses.
- Minimize the adverse transportation related environmental impacts and foster positive environmental impacts with transportation improvements.

### Transportation Investment

- Provide a cost-effective investment strategy for the I-66 Corridor.

# SCREEN 2 STRATEGIES

***The Screen 2 Strategies represent a range of modal choices which focus on transit and highway improvements. Two of the strategies serve as the base for comparing the effectiveness of the strategies and are defined as follows:***

### Baseline Scenario

The existing transportation system and committed improvements as defined in the region's Constrained Long Range Transportation Plan.

### Enhanced Baseline Scenario

The Baseline Scenario with significant bus system enhancements represents the low capital cost transportation system management alternative required to be evaluated in an environmental review.

***The Screen 2 Strategies are combinations of two or three of the following four major modal elements:***

### General Purpose Lanes

Adding general purpose lanes to I-66 and/or adjacent arterials.

### High Occupancy Vehicle (HOV) Lanes

Adding barrier-separated HOV lanes on I-66 and/or adjacent arterials.

### Light Rail Transit (LRT)

Construction of a light rail system in the corridor to serve the Dulles Airport and Manassas areas and the terminal Metrorail station.

### Metrorail

The extension of the existing Metrorail system in the corridor beyond the existing terminus at Vienna.

***Additional strategies that will be evaluated as part of Screen 2 are as follows:***

### I-66 Express/Local

This strategy would widen I-66 to six lanes in each direction with an express/local configuration.

### Super Bus

This strategy would substantially increase bus service in the corridor study area.

### Highway Plan

This strategy would incorporate selected roadway improvements that are part of the Comprehensive Plans of the counties.

### Rail to Gainesville

This strategy would put a fixed rail system in the median of I-66 between Vienna and Gainesville.

### Virginia Railway Express (VRE)

This strategy would extend VRE service to Gainesville.

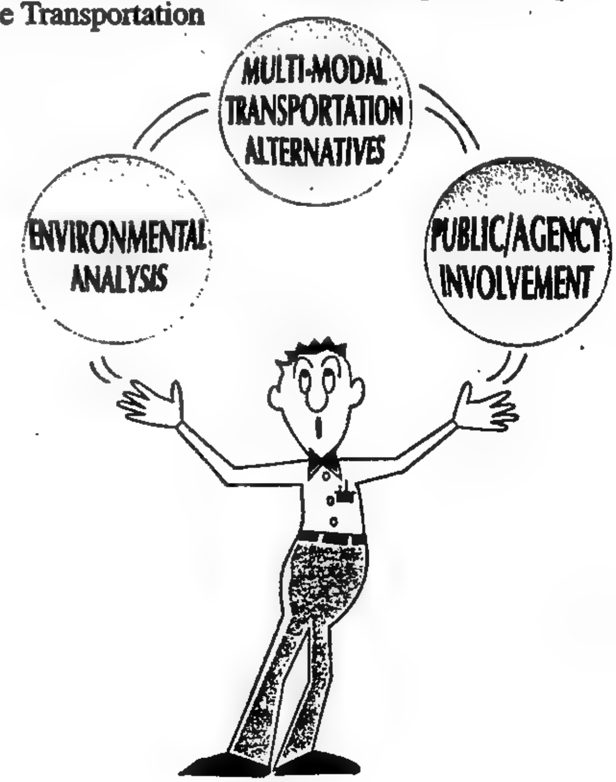
**Other considerations in the Screen 2 evaluation:**

- Bus transit service comparable to that defined as part of the Enhanced Baseline alternative will be included in all of the Screen 2 multi-modal strategies. The transit service will be reoriented to take advantage of transit facilities (rail or HOV) provided as part of each strategy.

- The terminus of each of the modal elements will be evaluated and further defined as an outcome of the Screen 2 evaluation.

- The Northern Virginia MIS regional travel computer model will be applied to develop travel forecasts for multi-modal strategies in Screens 2 and 3. This model is an enhanced version of the Dulles Corridor Transit Study model that incorporates an expanded geographical area.

- All of the screen strategies, except #11, assume the addition of an HOV lane in both directions on the Capital Beltway consistent with the region's Long Range Transportation Plan.

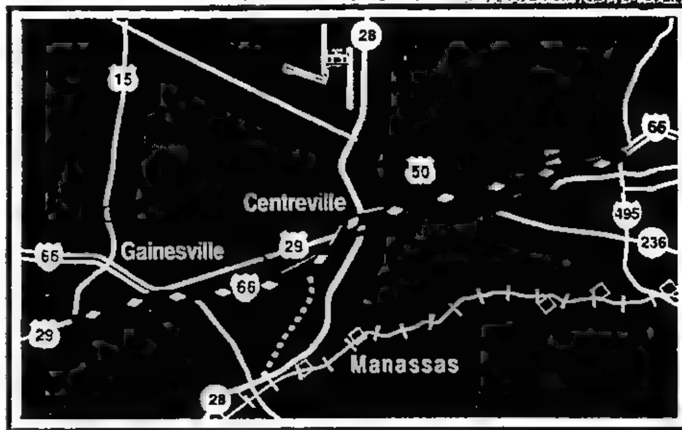


# TRANSPORTATION STRATEGIES TO BE EVALUATED

*The transportation strategies recommended to be evaluated as part of Screen 2 are described on the following pages.*

### Strategy #1 General Purpose Lanes and HOV

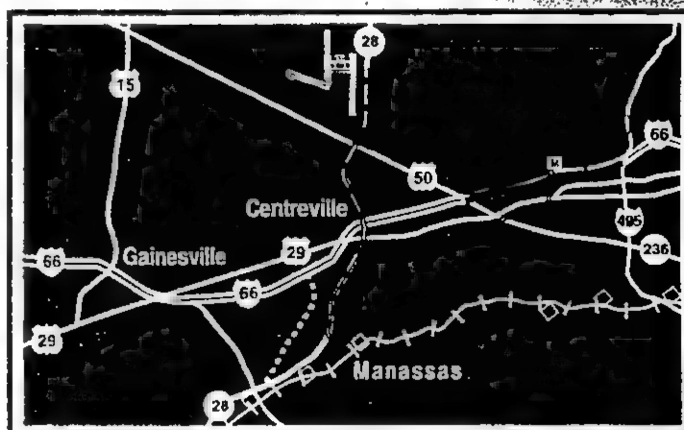
This strategy is primarily highway improvements. One general purpose lane would be added in each direction between I-495 and Route 50. In addition reversible, barrier-separated HOV lanes would be added to I-66 between I-495 and Gainesville. The HOV lanes would extend west from Gainesville on Route 29 through the intersection of Route 15. Route 50 would be widened to a six or eight-lane arterial from I-495 west to Route 28 and configured as a "super-arterial" with grade separations at most cross street intersections.




### Strategy #2 General Purpose Lanes and Light Rail

This strategy would combine additional general purpose lanes on I-66 with light rail service focused on the existing Metrorail terminus at Vienna.

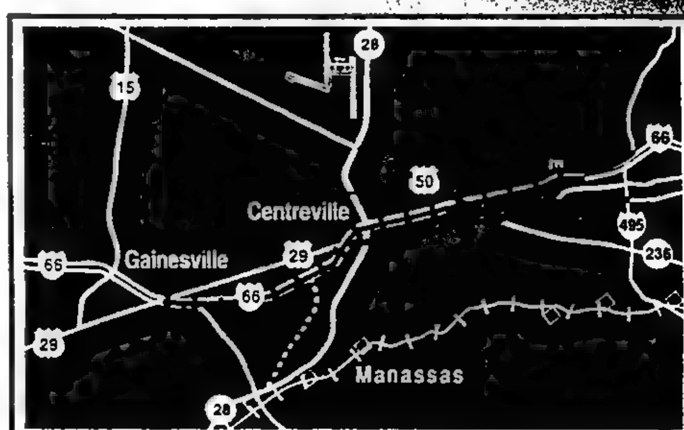
I-66 would be widened to include an additional general purpose lane in each direction between I-495 and Route 50. Light rail service would consist of two lines: one connecting the Manassas area to the Vienna Metrorail station, and one connecting the Dulles Airport area to the Vienna Metrorail station.




### Strategy #3 General Purpose Lanes and Metrorail

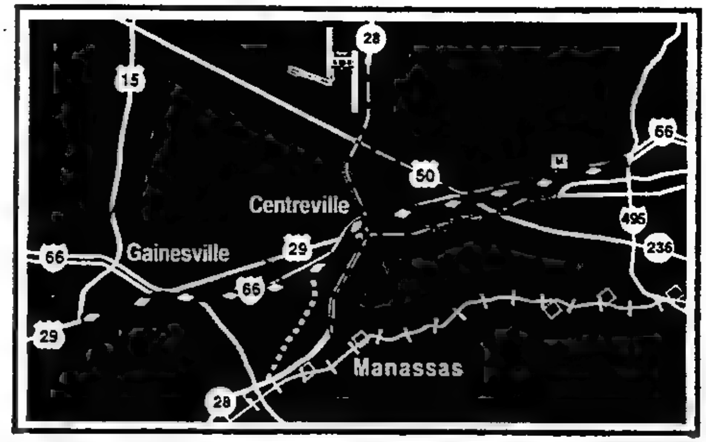
The improvements to I-66 would add one additional general purpose lane in each direction between I-495 and Route 50. Route 50 would be widened to a six or eight-lane arterial from I-495 west to Route 28 and configured as a "super-arterial" with grade separations at most cross street intersections.

Metrorail would be extended in the median of I-66 from the existing terminal station at Vienna to a new terminal station in the vicinity of Gainesville with a number of intermediate stations.



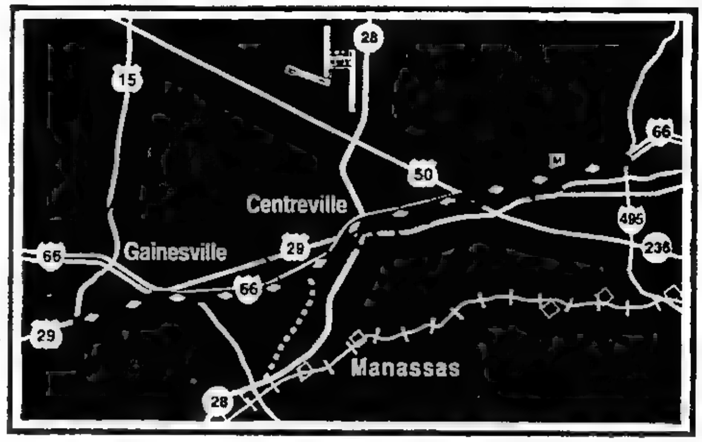
### Strategy #4  HOV and Light Rail

This strategy combines reversible, barrier-separated HOV lanes on I-66 with light rail lines to Route 28/50 and Manassas serving the existing Metrorail terminus at Vienna.  HOV would also be extended from I-66 at Gainesville along Route 29 through the Route 15 intersection.



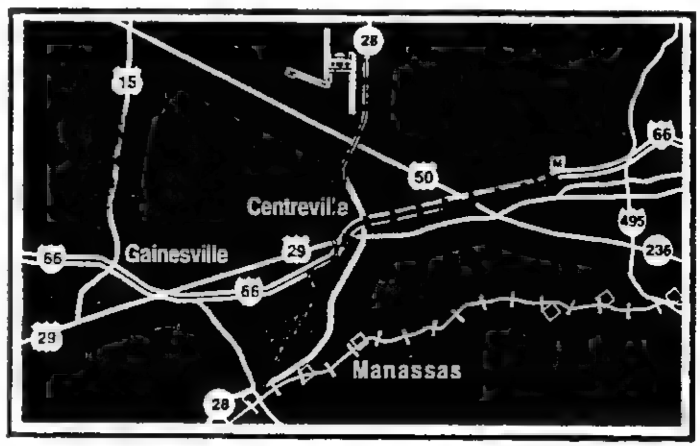

### Strategy #5  HOV and Metrorail

This strategy combines reversible, barrier-separated HOV lanes on I-66 with an extension of the existing Metrorail system to Centreville.  HOV would also be extended from I-66 at Gainesville along Route 29 through the Route 15 intersection.



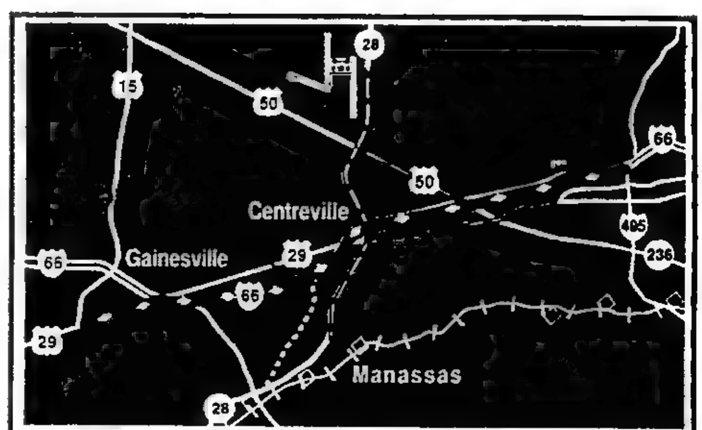

### Strategy #6  Light Rail and Metrorail

This strategy tests the effectiveness of extending Metrorail to Centreville with a light rail connection to the north and south from the Metrorail terminal station.  The southern light rail line would follow the Route 28 Bypass south to the vicinity of the Manassas Airport.  The northern light rail line would follow Stone Road and Route 28 north to the vicinity of Dulles Airport.



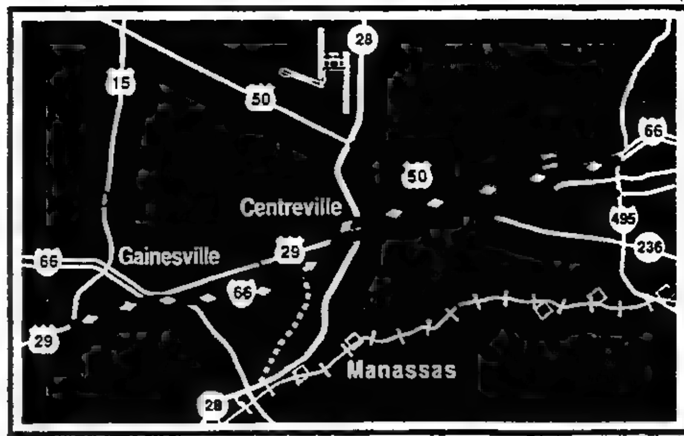

### Strategy #7 General Purpose Lanes, HOV and Light Rail

This strategy would combine additional general purpose lanes and reversible, barrier-separated HOV lanes on I-66 with light rail lines to Route 28/50 and Manassas serving the existing Metrorail terminus at Vienna.



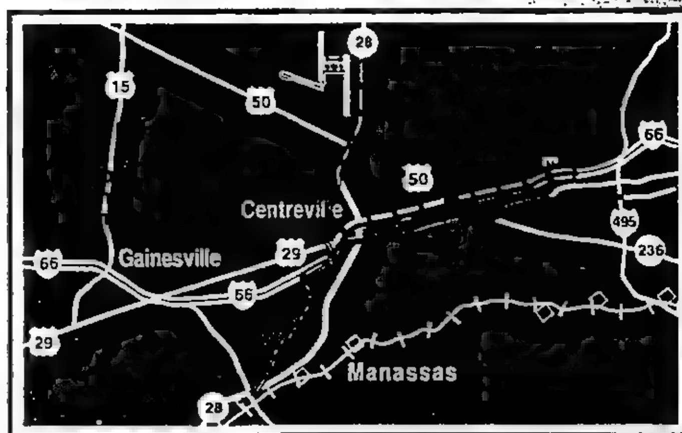
### Strategy #8 General Purpose Lanes, HOV and Metrorail

This strategy combines additional general purpose lanes on I-66, Route 29 and Route 50 and reversible, barrier-separated HOV as described in Strategy #1 with the extension of the existing Metrorail system to Centreville.



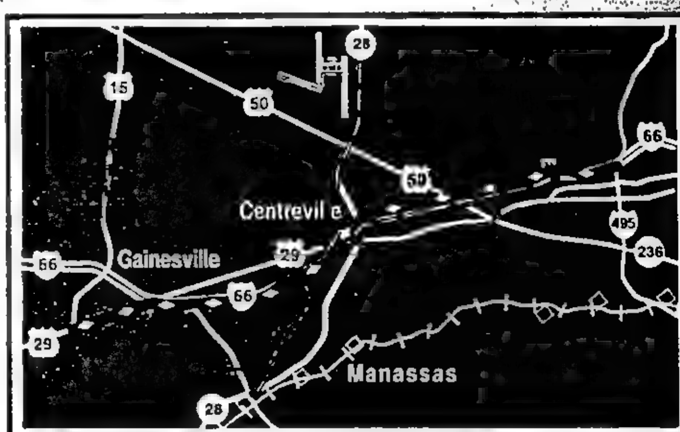

### Strategy #9 General Purpose Lanes, Light Rail and Metrorail

This strategy combines additional general purpose lanes on I-66, Route 29 and Route 50 with light rail service focused on an extended Metrorail terminus station at Centreville. The southern light rail line would follow the Route 28 Bypass south to the vicinity of the Manassas Airport. The northern light rail line would follow Stone Road and Route 28 north to the vicinity of Dulles Airport.



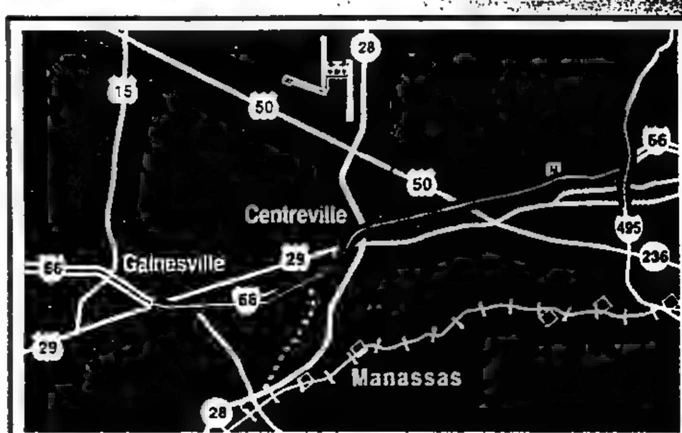

### Strategy #10 HOV, Light Rail and Metrorail

This strategy combines reversible, barrier-separated HOV with light rail lines to Route 28/50 and Manassas serving an extended Metrorail terminus station at Centreville. The southern light rail line would follow the Route 28 Bypass south to the vicinity of the Manassas Airport. The northern light rail line would follow Stone Road and Route 28 north to the vicinity of Dulles Airport.




### Strategy #11 I-66 Express/Local

This strategy would widen I-66 to six lanes in each direction with an express/local configuration. This strategy would also assume that the Beltway is widened to six lanes in each direction with an express/local configuration consistent with the Recommended Strategy Package in the January 1997 Capital Beltway Study MIS Results Report.



### Strategy #12 Super Bus

This strategy would consist of significant bus system improvements that include expanding existing service, providing new service between various origins and destinations, reducing time between buses, and increasing the frequency of service on Metrorail to Vienna. This strategy is intended to represent a more flexible transit improvement that could better serve the travel patterns in the corridor.

### Strategy #13 Highway Plan

This strategy would include selected roadway improvements that are part of the Fairfax County, Loudoun County, and Prince William County Comprehensive Plans but are not in the region's constrained long range plan. Improvements to be included in the strategy will be defined in consultation with county staff. Preliminary recommendations for inclusion in this strategy include the following roadways:

- Proposed Tri-County Parkway
- Proposed Stone/Braddock Road Connector
- Proposed Route 234 Bypass north of I-66

## GET INVOLVED

*We want to hear from you!*

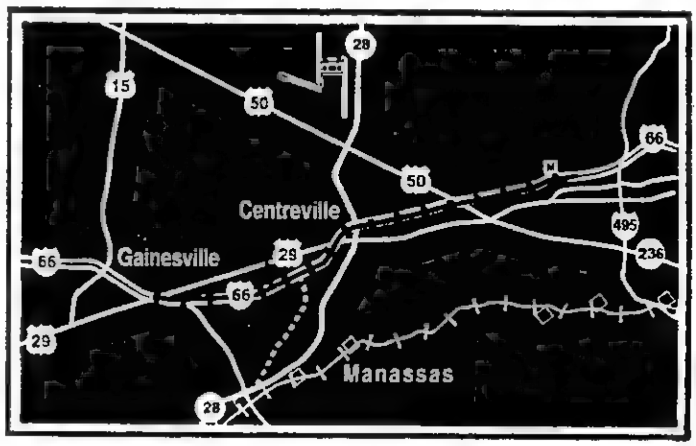
Call the I-66 HOTLINE
**1-800-811-4661**
**(Device for the hearing impaired: 1-800-307-4630)**

Write to us using the enclosed comment sheet

Visit the I-66 Corridor MIS web site:
**http://www.vdot.state.va.us/proj/66x.html**

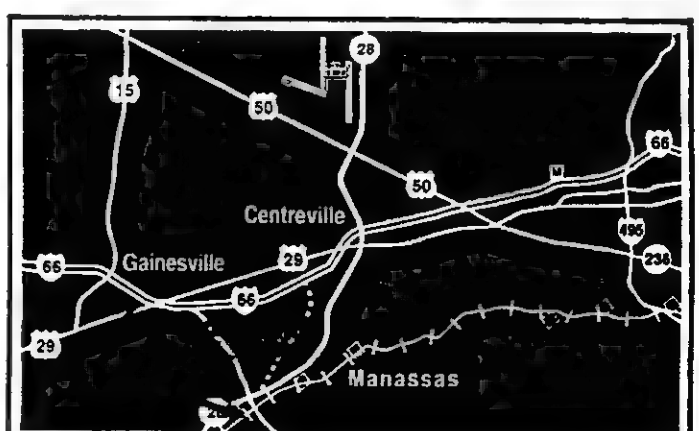
### Strategy #14 Generic Rail to Gainesville

This strategy would put a fixed rail system in the median of I-66 between the Vienna Metrorail station and Gainesville. The rail system may be directly compatible with Metrorail or may be a different technology requiring a transfer at Vienna.




### Strategy #15 Virginia Railway Express

This strategy would extend VRE service to Gainesville. This element could be combined with any of the strategies defined above.



# WHAT ELSE IS HAPPENING IN THE AREA

## ROUTE 29 CORRIDOR DEVELOPMENT STUDY UPDATE

On January 27, 1997 approximately 250 people attended VDOT's Public Information Meeting in Haymarket on the Route 29 Study. While no formal presentation was made, attendees viewed [illegible] ...ged to [illegible] document [illegible] a writ[illegible] g pro[illegible] VDO[illegible] re any[illegible] the Rout[illegible] Development Study will be in[illegible] I-66 Corridor MIS.

**For more information call the [illegible] 1-800-811-4661.**

## CAPITAL BELTWAY MAJOR INVESTMENT STUDY (MIS)

VDOT published the Capital Beltway MIS Results Report in January 1997. The Results Report includes a Recommended Strategy Package that identifies the transportation strategies that will be studied in mo[illegible]. The Recomme[illegible] Str[illegible] includes [illegible] HOV l[illegible] the existing con-[illegible] figurin[illegible] ith or [illegible] de int[illegible] h expr[illegible] al Beltw[illegible] these op[illegible] more detail a[illegible] ation of environmental documen[illegible] eral requirements.

**For more information call the [illegible] Hotline at 703-359-6683.**

## GAINESVILLE AREA TRANSPORTATION STUDIES

Numerous transportation studies are currently being conducted within the Gainesville area. VDOT is developing a comprehensive mailing list for the entire area to increase public involvement and awareness of the studies.

Project status updates are being provided to local officials.


For more information on these studies call the hotlines listed below:

- Route 29 Corridor Development Study
  1-800-811-4661
- Manassas Railroad Alignment Improvement Study
  1-804-786-6757

For more information on the Western Transportation Corridor Study write:

c/o Ms. Susan Killen
Parsons Brinckerhoff Quade & Douglas
465 Spring Park Place
Herndon, Virginia 22070

or visit the VDOT web page at

http://www.vdot.state.va.us

## THE STUDY TEAM:

The I-66 Corridor MIS is being conducted by the Department of Rail and Public Transportation and the Virginia Department of Transportation. The study will be reviewed by the Technical and Policy Advisory Committees. The Policy Advisory Committee will make recommendations for further actions to the Secretary of Transportation and the Commonwealth Transportation Board.

**Technical Advisory Committee:**

Virginia Department of Transportation
Virginia Department of Rail & Public Transportation
Federal Transit Administration
Federal Highway Administration
National Park Service
Metropolitan Washington Council of Governments
Northern Virginia Transportation Commission
Potomac-Rappahannock Transportation Commission
Virginia Railway Express
Washington Metropolitan Area Transit Authority
Metropolitan Washington Airports Authority
Arlington County
Fairfax County
Fauquier County
Loudoun County
Prince William County
City of Fairfax

**Policy Advisory Committee:**

Robert T. Lee, Chair, *Commonwealth Transportation Board*
Ellen M. Bozman, *Arlington Board of Supervisors*
Robert B. Dix, Jr., *Fairfax County Board of Supervisors*
Michael R. Frey, *Fairfax County Board of Supervisors*
Katherine K. Hanley, *Fairfax County Board of Supervisors*
David C. Mangum, *Fauquier County Board of Supervisors*
John Mason, Mayor, *City of Fairfax*
Charles A. Robinson, Jr., Mayor, *Town of Vienna*
Kathleen Seefeldt, *Prince William County Board of Supervisors*
David Snyder, *City of Falls Church*
Edgar S. Wilbourn, III, *Prince William County Board of Supervisors*

I-66 Major Investment Study

I-66 Corridor MIS Project Manager
VA Department of Rail & Public Transportation
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Richmond, VA 23219-1939

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# I-66 CORRIDOR Major Investment Study

# INFORMER

## COMMENT SHEET

### WHAT DO YOU THINK?

Understanding the concerns of our customers is important to the Department of Rail and Public Transportation and the Virginia Department of Transportation. We need your help to plan the future transportation system in Northern Virginia. Please take a few minutes to answer these questions and give us your comments on the I-66 Corridor Major Investment Study.

Is the information in this issue of the *INFORMER:*

Useful? ______________________________

Understandable? ______________________________

Comments? ______________________________

______________________________

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______________________________

What would you like to see in future issues of the *INFORMER?* ______________________________

______________________________

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What comments or suggestions do you have regarding the study process or transportation strategies being evaluated? ______________________________

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Name: ______________________________

Address: ______________________________

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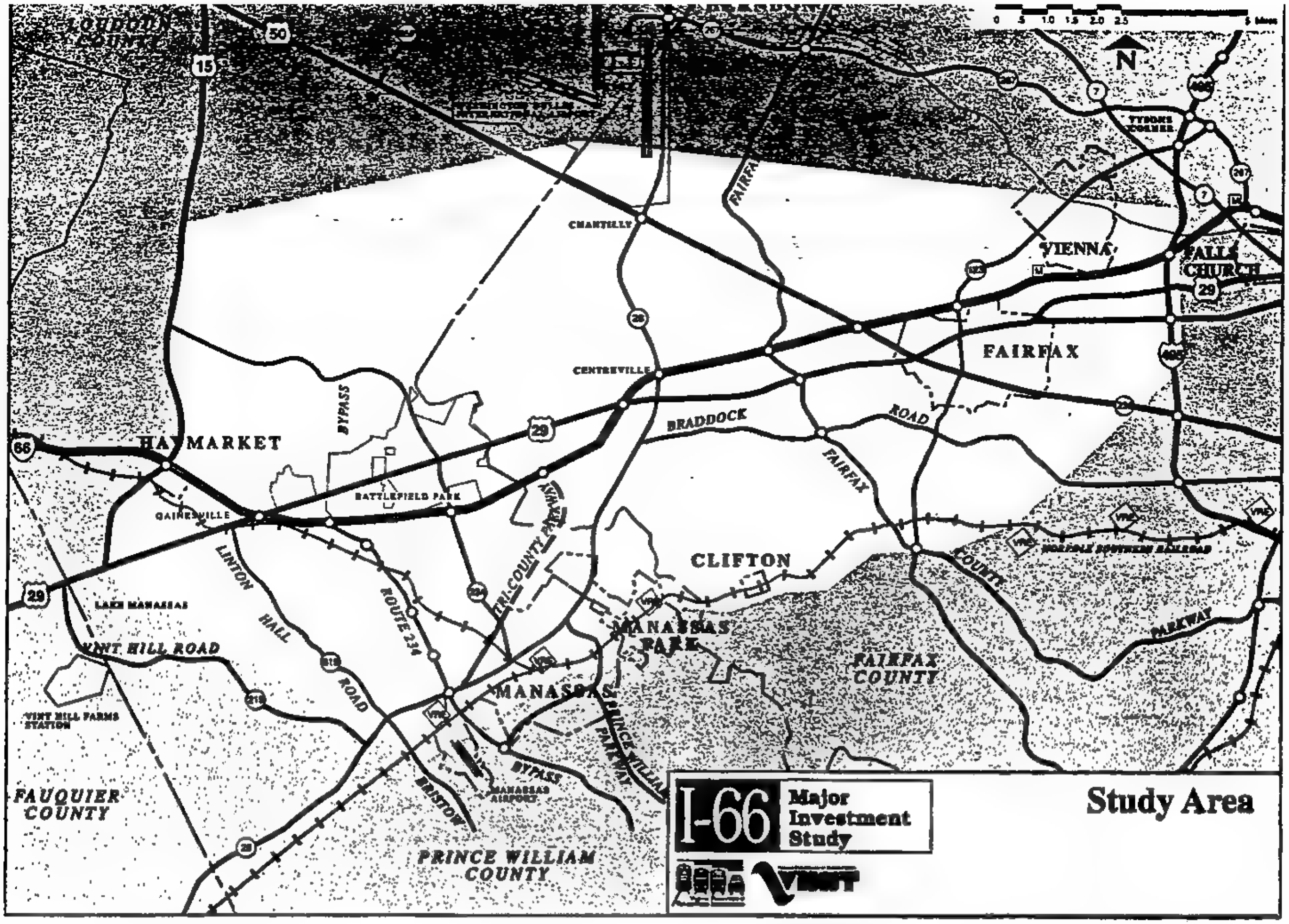
Virginia Department of Rail and Public Transportation

Virginia Department of Transportation VDOT




I-66 Major Investment Study

I-66 Corridor Project Manager
VA Department of Rail & Public Transportation
1401 E. Broad Street, Room 1412
Richmond, VA 23219-1939

PLACE
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HERE

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VA Department of Rail & Public Transportation
1401 E. Broad Street, Room 1412
Richmond, VA 23219-1939

please use tape to close

I-66 Major Investment Study INFORMER

Issue Two February 1996

## DISCUSS AND COMMENT ON THE STUDY ALTERNATIVES ON MARCH 11 AND 19

### *Join Us in Reviewing Ways to Improve Transportation in the I-66 Corridor*

**Where and When:** The Virginia Department of Rail and Public Transportation (DRPT) and the Virginia Department of Transportation (VDOT) invite you to attend the second set of public workshops to discuss and evaluate alternative ways to address congestion and other issues in the I-66 Corridor. The workshops will be held:

| Date | Place | Time |
|---|---|---|
| March 11 | Stonewall Middle School<br>Manassas | Doors Open 7:00 PM<br>Presentation 7:30 PM |
| March 19 | Lanier Intermediate School<br>Fairfax | Doors Open 7:00 PM<br>Presentation 7:30 PM |

**What We'll Review:** The March workshops will focus on a review of the initial set of alternative transportation improvement elements - roadway construction, HOV extensions, rail service, and others - currently under study as presented on pages 2 through 5. Some alternative elements are not recommended for further study following an initial screening using these criteria:

- ***Engineering Feasibility*** - Is it feasible to construct and operate?
- ***Social, Economic and Environmental Effects*** - How is the alternative element likely to affect the natural environment and the community context?
- ***Transportation Investment*** - What is the capital cost?
- ***Goals and Objectives*** - Will this alternative element meet the goals and objectives of the study?

**What Next:** Alternative elements kept for further consideration will be developed in more detail and subject to more extensive evaluation, including traffic operations, transit ridership, more in-depth consideration of impacts to wetlands, air quality, noise, neighborhoods, parklands, cultural resources, and refined capital and operating cost estimates.

During the next phase of this study, individual alternative elements will be combined into multi-modal transportation investment strategies to respond to complex future transportation needs.

## NOVEMBER 1995 WORKSHOPS YIELD RESULTS - THANKS!

Thanks for your contributions during the November 14th and 15th, 1995 public workshops. Taking your comments into consideration, we have refined the study's problem statement. Your comments at those meetings focused on three areas:

- **Vehicular Congestion** - problems at the beltway interchange, congestion on north-south routes, traffic congestion on weekends and evenings and operational conflicts associated with the I-66 HOV lanes.
- **Transit Accessibility** - not enough suburb to suburb service and lack of service during off-peak hours.
- **Transportation System Coordination** - the need for multiple transfers and associated delays, high cost of transit in terms of dollars, time and convenience relative to driving and parking.

Many suggested alternative elements as part of the I-66 MIS. Suggestions made at the workshop are addressed in this study in one of three ways:

### *Suggestions Considered as New Alternative Elements in the I-66 MIS:*

- Reversible General Purpose Express Lanes on I-66
- North-South HOV or LRT along Rt 28 or Rt 50

### *Suggestions Addressed by or Incorporated into Alternative Elements in the MIS:*

- High Speed Telecommunications - The effects of telecommuting will be incorporated into the travel demand forecasting process.
- Monorail - A monorail system would have similar impacts to Metrorail.
- Bicycle Facilities - Bicycle related improvements will be evaluated as part of all alternatives, but will not be studied as a separate element.
- Toll Roads - Tolls will be evaluated as a potential financing option.

### *Suggestions Noted but not Carried Forward in the MIS:*

- Eliminate HOV Lanes on I-66 - Inconsistent with regional policies to reduce emissions by encouraging ride-sharing. Elimination of HOV lanes on I-66 would not meet the goals and objectives of this study.
- Air Service - The provision of commuter air service through the corridor was determined to be impractical.
- Moveable Barriers - The median separation of I-66 makes this infeasible.

# I-66 CORRIDOR MIS ALTERNATIVE ELEMENTS: WHAT DO YOU THINK?

Possible alternative elements under study to improve transportation in the I-66 Corridor include a range of modes: roadway improvements, extensions of HOV facilities, and provision of commuter rail, light rail or metro rail service. The ultimate goal of the I-66 MIS will be to combine these single mode elements to develop a comprehensive, multi-modal transportation investment strategy for the corridor. Together, we must decide which of these modes might be most appropriate for future study as part of this comprehensive strategy to solve corridor problems. Which alternative elements would best serve the needs of the corridor? Come let us know at the meetings on March 11 and 19, or write to the I-66 MIS Project Manager at the return address on this newsletter, or call us on the I-66 Hotline at *1-800-811-4661.*

***We look forward to hearing from you.***

### 1. Baseline Scenario

Existing Transportation System and Committed System Improvements as Defined in the Constrained Long-Range Transportation Plan.

### 2. Congestion Management

Generally Low Cost Improvements to Manage Congestion Including:

- Travel Demand Management (TDM)
- Transportation System Management (TSM)
- Intelligent Transportation Systems (ITS)
- Bus System Improvements

## VIRGINIA RAILWAY EXPRESS (VRE) ALTERNATIVE ELEMENT

The VRE provides commuter rail service in the I-66 corridor terminating at the Broad Run/Manassas Airport Station. Alternative 5 would extend VRE service from Manassas along the existing Norfolk and Southern railroad to Gainesville and Haymarket. Stations would be sited in accordance with local plans and forecasted travel demand.

### 5. Commuter Rail Extension

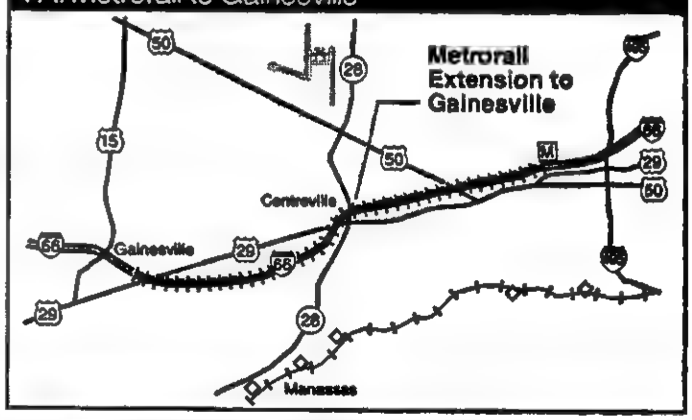

## METRORAIL ALTERNATIVE ELEMENTS

Metrorail currently extends along I-66 to Vienna. Metrorail extensions considered in this study are:

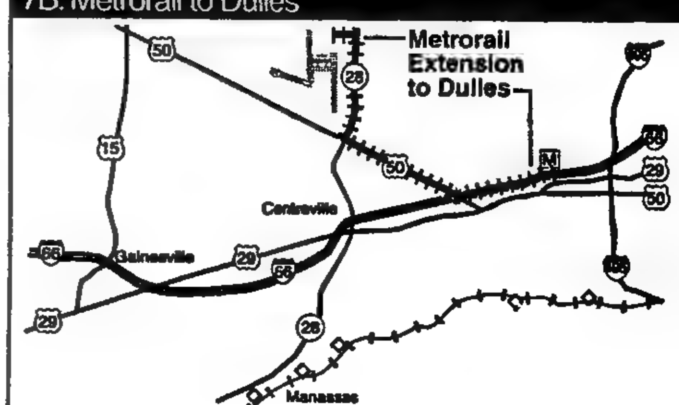
- **7A** - Extend Metrorail in the median of I-66 to a terminal station in the vicinity of either Centreville or Gainesville.
- **7B** - Extend Metrorail in the median of I-66 to Route 50 then north to Chantilly (Route 28) then possibly continuing to Dulles.

Stations would be sited in accordance with local plans and forcasted travel demand.

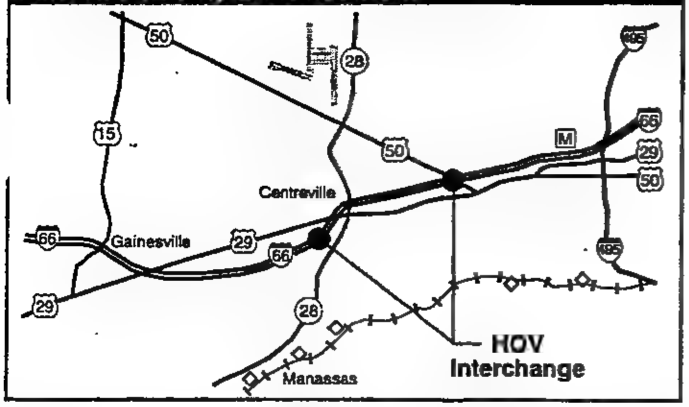
### 7A. Metrorail to Gainesville



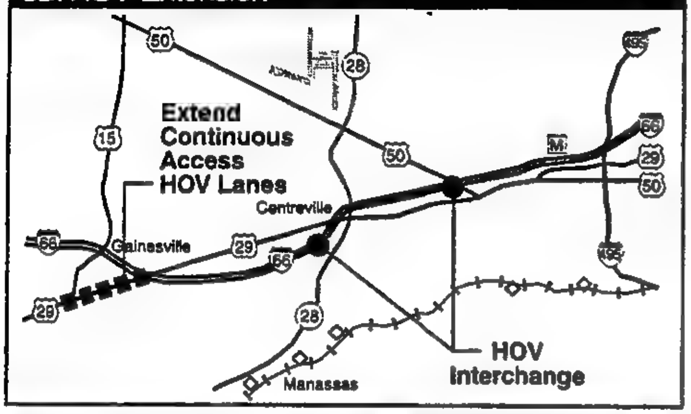

### 7B. Metrorail to Dulles



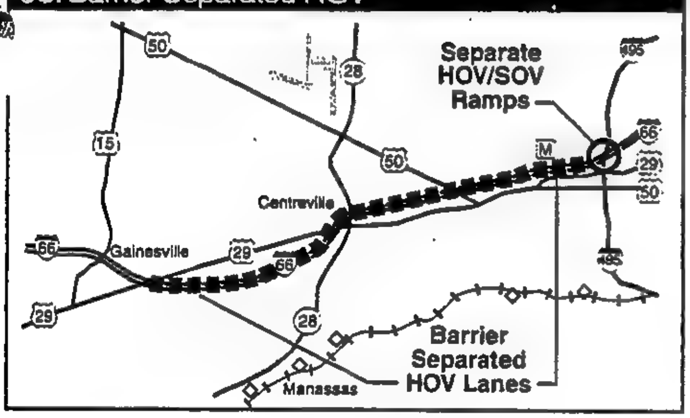
## 3A. HOV Facility Enhancement




## 3B. HOV Extension




## 3C. Barrier Separated HOV



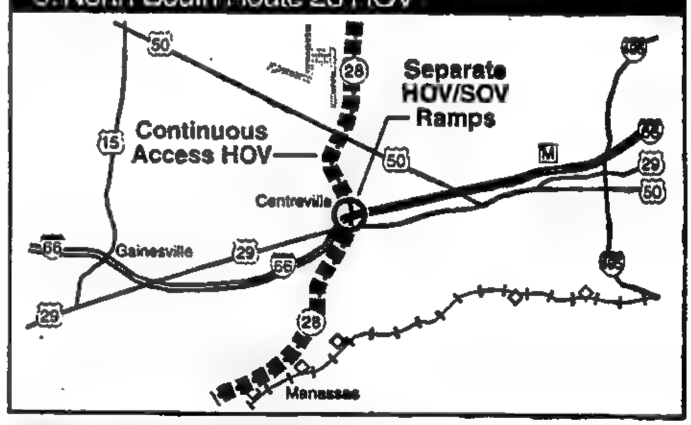

# HIGH OCCUPANCY VEHICLE (HOV) ALTERNATIVE ELEMENTS

Continuous-access HOV lanes currently exist in the I-66 corridor from Gainesville to I-495 and continue inside the beltway. HOV elements under consideration are:

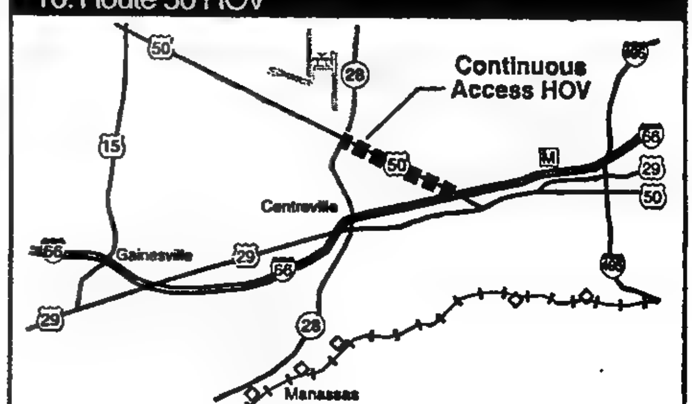
- **3A** - Improve access to the existing I-66 HOV lanes by providing additional dedicated HOV interchanges similar to that under construction at Stringfellow Road.
- **3B** - Provide improved HOV access and extend HOV lanes along Route 29 from I-66 to Route 15.
- **3C** - Reconstruct I-66 from Gainesville to I-495 to provide limited-access, barrier separated HOV lanes and separate HOV ramps at I-495.
- **9*** - Provide continuous-access HOV lanes in the Route 28 corridor between Dulles Airport and Manassas with separate HOV ramps at the I-66/Route 28 interchange.
- **10*** - Provide continuous-access HOV lanes in the Route 50 corridor between I-66 and Route 28 with separate HOV ramps at the I-66/Rt 50 interchange.

** These elements are not recommended to be carried foward. Element #9 does not meet the east/west travel focus for this study. HOV access to I-66 (Element #10) will be considered in more detail in the next phase of this study.*

## *9. North-South Route 28 HOV




## *10. Route 50 HOV

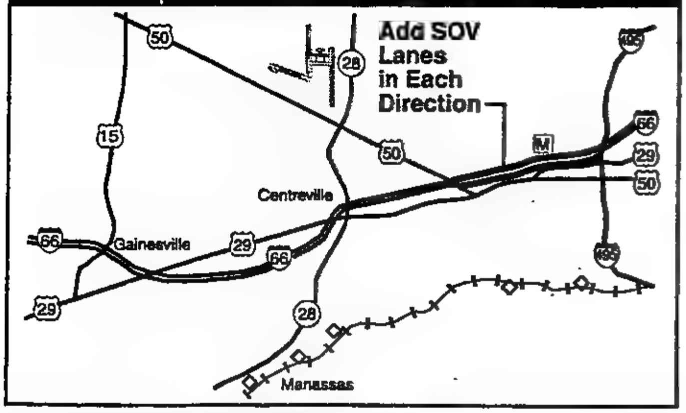



QUESTIONS, COMMENTS, SUGGESTIONS?

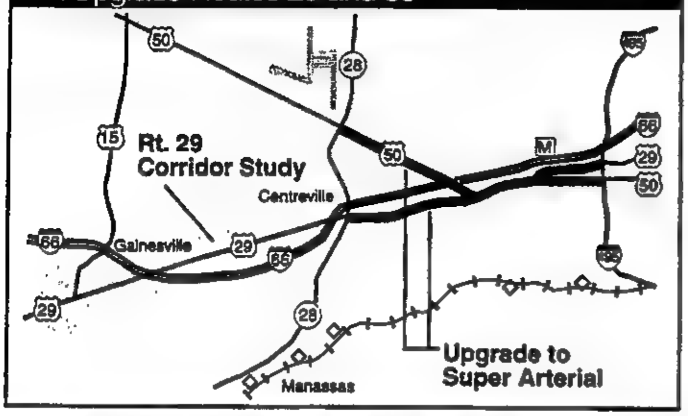
Call the I-66 HOTLINE

1-800-811-4661

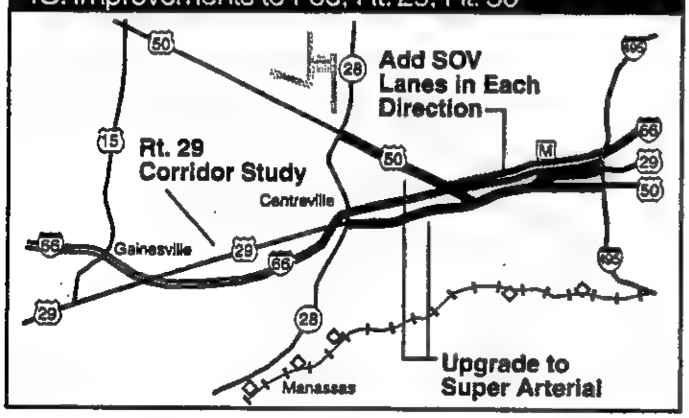
4A. I-66 Improvements




4B. Upgrade Routes 29 and 50




4C. Improvements to I-66, Rt. 29, Rt. 50




## ROADWAY IMPROVEMENT ALTERNATIVE ELEMENTS

These elements would expand or improve existing roadways to increase vehicular capacity. Alternative elements under consideration are:

- **4A** - Widen I-66 from Route 50 to I-495 to provide one or more additional lanes in each direction.
- **4B** - Upgrade Route 29 and Route 50 to super arterial roadways. These facilities would typically have six lanes with grade separations (interchanges) with major cross streets. Route 29 west of Centreville is being addressed by the Route 29 Corridor Study as discussed below.
- **4C** - Widen I-66 and upgrade Route 29 and Route 50.
- **11** - Reconstruct I-66 from Haymarket to I-495 to provide reversible, general purpose express lanes in the median of I-66. These lanes would have limited access and would operate eastbound in the morning and westbound in the evening.

11. Reversible General Purpose Express Lanes


## ROUTE 29 CORRIDOR STUDY

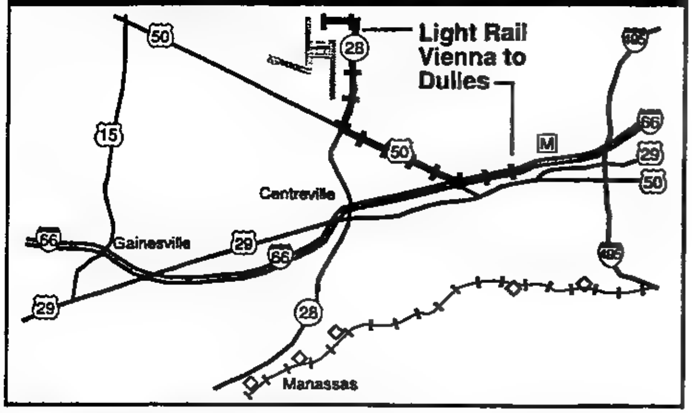
In addition to the alternatives described above, VDOT is also conducting a Route 29 corridor study. This study is evaluating Route 29 between Centreville and Warrenton to determine the most cost effective way to provide a continuous, limited access highway that will meet standards applicable to the National Highway System. One goal of the study is to minimize traffic through the Manassas Battlefield Park. The study will evaluate the feasibility of alternative conceptual alignments to bypass the park including alignments north and south of the park. The Route 29 corridor study will have a separate public involvement process but the results of the study will be incorporated into the I-66 MIS.

*QUESTIONS, COMMENTS, SUGGESTIONS?*

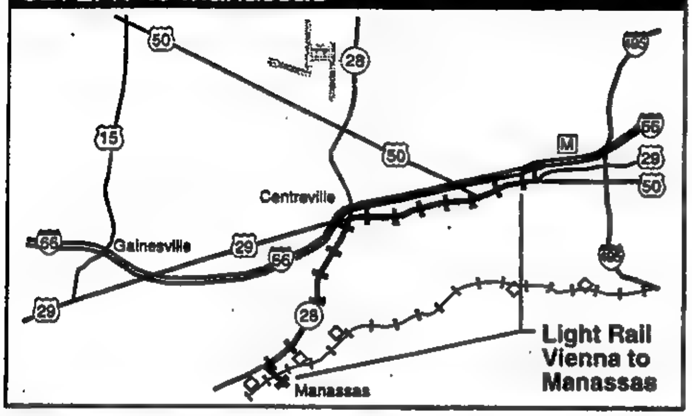
Call the I-66 HOTLINE

1-800-811-4661

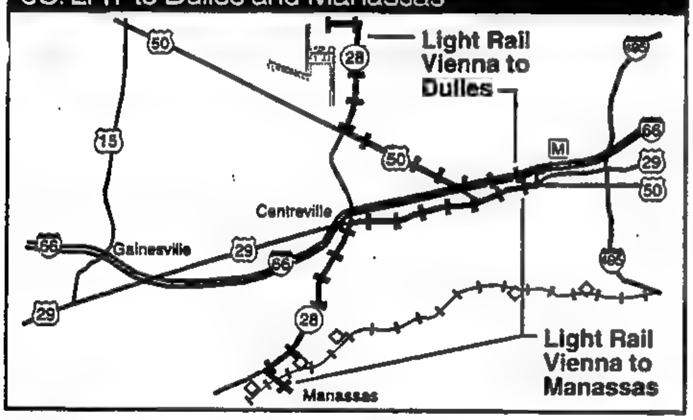
6A. LRT to Dulles




6B. LRT to Manassas




6C. LRT to Dulles and Manassas




## LIGHT RAIL TRANSIT (LRT) ALTERNATIVE ELEMENTS

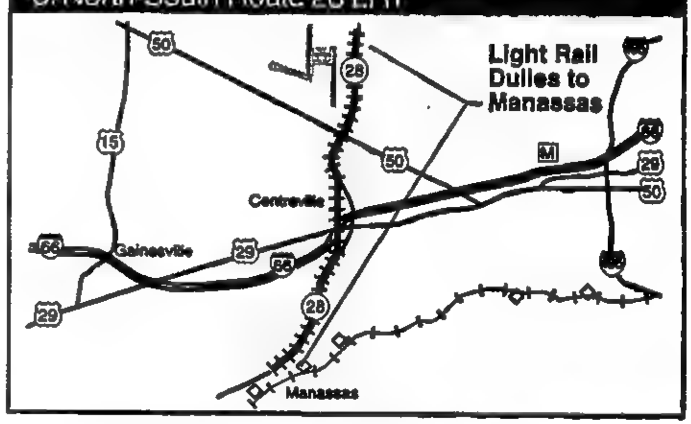
LRT service, similar to systems in Baltimore, Portland, and San Diego would be a new mode of travel in the corridor. Alternative elements under consideration are:

- **6A** - Provide LRT service from the Vienna Metrorail following I-66, Route 50 and possibly extending along Route 28 to Dulles Airport.
- **6B** - Provide LRT service from the Vienna Metrorail station to the vicinity of Manassas following Route 29 through Fairfax City to Route 28.
- **6C** - Provide LRT service from the Vienna Metrorail station to both Dulles Airport and Manassas.
- **8*** - Provide LRT service along Route 28 between Dulles Airport and Manassas.

Under all elements, stations would be sited in accordance with local plans and forecasted travel demand.

** This element is not recommended to be carried forward because it does not meet the east/west travel focus for this study.*

8. North-South Route 28 LRT




## ALTERNATIVE ELEMENTS RECOMMENDED NOT TO BE CARRIED FOWARD

**Following initial evaluation the following elements are recommended not to be carried forward in the study process:**

- **7B** - Metrorail to Dulles
- **8** - LRT Service Between Manassas and Dulles Airport
- **9** - North-South Route 28 HOV
- **10** - Route 50 HOV

**If travel demand forecasts performed in the coming months indicate a need to reconsider any of these elements, then they could be reexamined. Your comments to these and other recommendations included in this newsletter are welcome at the return address on the mailing label or by calling 1-800-811-4661**

## I-66 CORRIDOR MIS POLICY ADVISORY COMMITTEE ESTABLISHED

Secretary of Transportation Robert E. Martínez has established a Policy Advisory Committee (PAC) to provide guidance to DRPT and VDOT on decisions regarding the I-66 Corridor MIS. The PAC will meet frequently throughout the study process to review interim study products and provide advice on major study decisions. Membership of the PAC is as follows:

Robert T. Lee, Chair
Commonwealth Transportation Board

Ellen M. Bozman
Arlington County Board of Supervisors

Robert B. Dix, Jr.
Fairfax County Board of Supervisors

Michael R. Frey
Fairfax County Board of Supervisors

Katherine K. Hanley
Chairman, Fairfax County Board of Supervisors

John Mason
Mayor, City of Fairfax

Charles A. Robinson, Jr.
Mayor, Town of Vienna

Kathleen Seefeldt
Chairman, Prince William County Board of Supervisors

David Snyder, Councilman
Falls Church

## I-66 Major Investment Study — PUBLIC WORKSHOPS MARCH 11 AND 19

You are invited to attend a public workshop to discuss ways to improve transportation in the I-66 corridor. The workshop will be on two nights:

- Monday, March 11, 1996 at Stonewall Middle School in Manasses
- Tuesday, March 19, 1996 at Lanier Intermediate School in Fairfax.

On both evenings, doors will open at 7:00pm with a presentation at 7:30, followed by workshop discussions until 9:00pm. We look forward to seeing you there.

I-66 Major Investment Study

I-66 MIS Project Manager
DRPT
1401 E. Broad Street, Room 1412
Richmond, VA 23219-1939

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# I-66 Major Investment Study INFORMER

ISSUE One

November 1995


## WHY AN ANALYSIS OF THE I-66 CORRIDOR ?

Over the past two decades, significant investments have been made in the I-66 Corridor to improve the transportation infrastructure. Additional transportation investments are likely to be needed in the future to respond to the following transportation issues:

- *Existing Vehicular Congestion in Both Peak Periods.*
- *Forecasts of worse congestion and increase in Vehicle-Miles of Travel in the Year 2020.*
- *Existing and Forecasted Dispersion of Population and Employment Throughout the Corridor.*
- *Air Quality Violations.*
- *Transit Accessibility to Employment Opportunities in Corridor.*
- *Physical Limitations on Ability to Expand Corridor Infrastructure.*
- *Coordination and Management of the Multi-Modal Transportation System in the Corridor.*
- *Financial Resources to Pay for Needed Transportation Facilities and Services.*
- *Management and Coordination of Movement of Goods in the Corridor.*

## WHAT WILL RESULT FROM THE STUDY ?

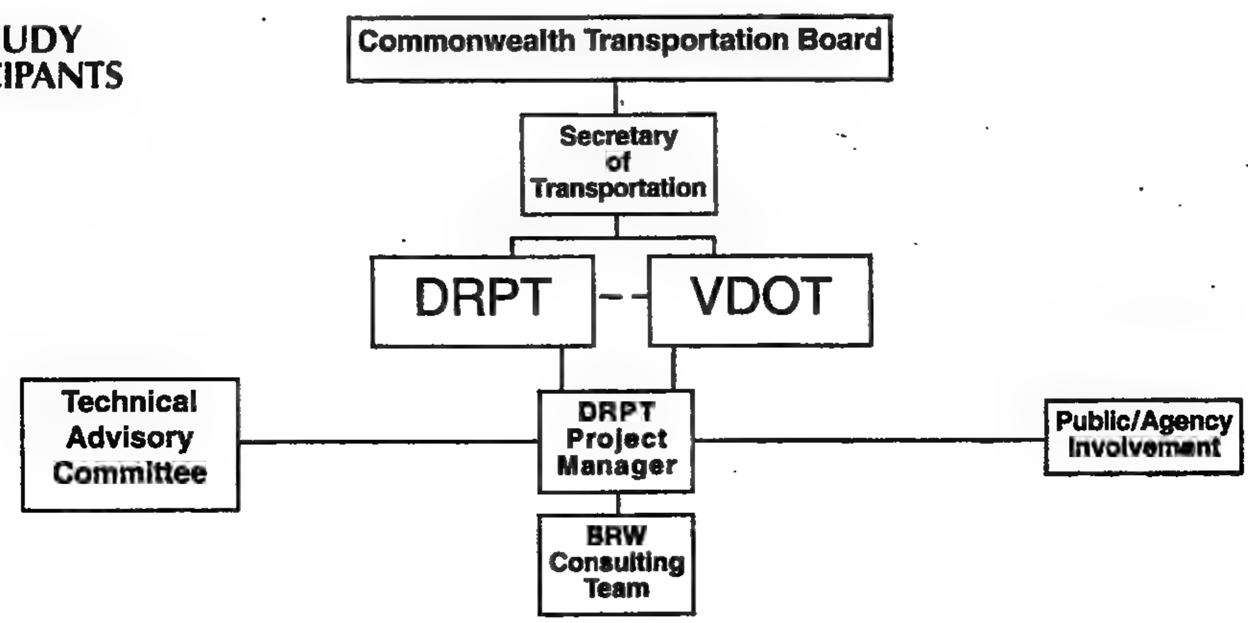
The I-66 Major Investment Study (MIS) is being conducted to develop a regional consensus on a transportation investment strategy for the corridor that:

- ***Responds to the existing imbalance between transportation supply and demand;***
- ***Supports anticipated growth and development in the corridor;***
- ***Integrates the multi-modal transportation systems in the corridor; and,***
- ***Provides input to other transportation facility and land use development decisions in the corridor.***
- ***Provides input to the on-going regional transportation planning process.***

## WHO IS SPONSORING THE MIS?

The study is being sponsored by the Virginia Department of Rail and Public Transportation (DRPT) and the Virginia Department of Transportation (VDOT).

## THE STUDY PARTICIPANTS

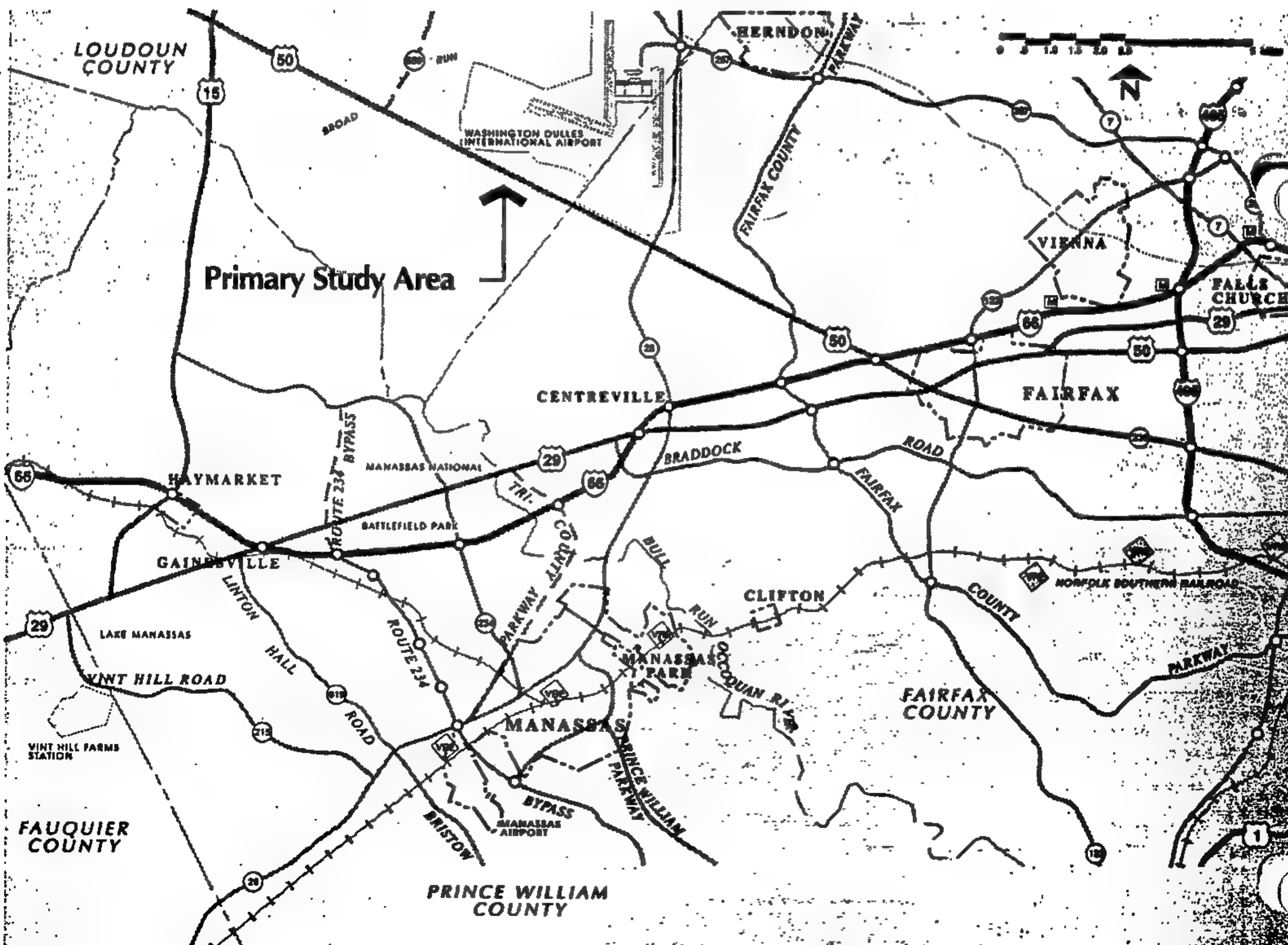


## WHAT IS A MAJOR INVESTMENT STUDY?

A major investment is a highway or transit improvement of substantial cost that is expected to have a significant effect on capacity, traffic, level of service or mode share in a corridor or part of a region. This major investment study (MIS) is a comprehensive analysis of a range of transportation alternatives. The transportation issues of the I-66 corridor are complex. The MIS is designed to analyze the breadth of transportation and related community issues through a comprehensive study approach including:

- ***Public and Agency Participation***
- ***Problem Definition (Purpose and Need)***
- ***Travel Demand Forecasts***
- ***Multi-modal Alternatives***
- ***Conceptual Engineering***
- ***Cost Estimating***
- ***Environmental Screening***
- ***Benefits Assessment***
- ***Alternatives Evaluation***
- ***Identification of a Locally Preferred Investment Strategy***

## PROPOSED PRIMARY STUDY AREA




*QUESTIONS, COMMENTS, SUGGESTIONS?* **Call the I-66 HOTLINE 1-800-811-4661**

## WHAT ALTERNATIVES ARE BEING CONSIDERED ?

Transportation alternatives for the I-66 Corridor are being defined. The range of potential alternatives includes:

***No-Build*** - This alternative includes completion of the current construction on I-66, extension of high occupancy vehicle (HOV) lanes to Gainesville, and expansion of feeder bus service to Metro and VRE stations.

***Travel Management*** - This alternative would include travel demand management (TDM), transportation system management (TSM) and intelligent transportation system (ITS) improvements along with transit service improvements.

***HOV/Busway*** - Improved high occupancy vehicle (HOV) facilities would be provided to encourage HOV use. This could include extension of HOV facilities, dedicated HOV access, and barrier separation of HOV lanes.

***Metro-like Rail*** - A rail system with design and operating standards similar to Metrorail would be extended in the corridor.

***Commuter Rail*** - The existing Virginia Railway Express (VRE) commuter rail service would be extended in the corridor.

***Basic Rail*** - Basic rail service could be powered by either an electrified third rail or an overhead catenary. Basic rail service would likely extend from the Vienna Metrorail station to points west within the primary study area.

***I-66 Improvements*** - Under this alternative, I-66 would be improved to provide additional general travel lanes and upgraded interchanges.

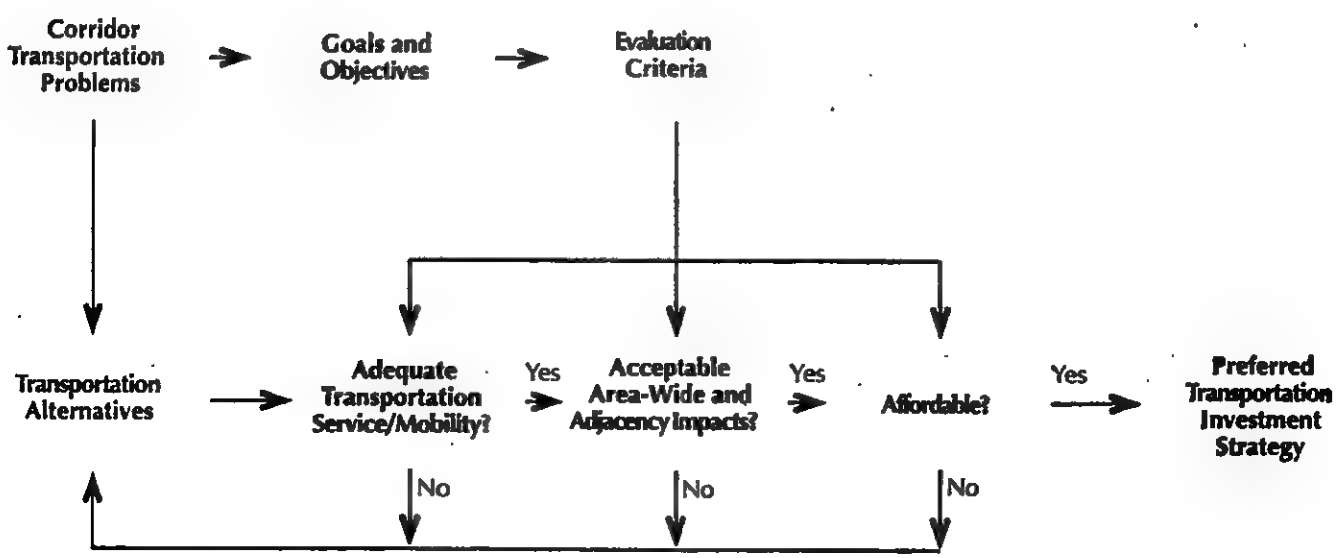
***Parallel Roadway Improvements*** - Other routes in the Study area would be improved to provide additional traffic capacity.

## HOW WILL ALTERNATIVES BE EVALUATED?

The selected transportation investment strategy is likely to consist of some combination of the range of alternative transportation improvements listed above. The MIS process will identify, evaluate, eliminate and/or refine alternatives based on the following general criteria:

- ***Does the alterative provide adequate transportation service and mobility?***
- ***Are the impacts to adjacent properties and the region acceptable?***
- ***Is the transportation alternative affordable?***

## OVERVIEW OF I-66 MAJOR INVESTMENT STUDY PROCESS



## HOW CAN YOU GET INVOLVED ?

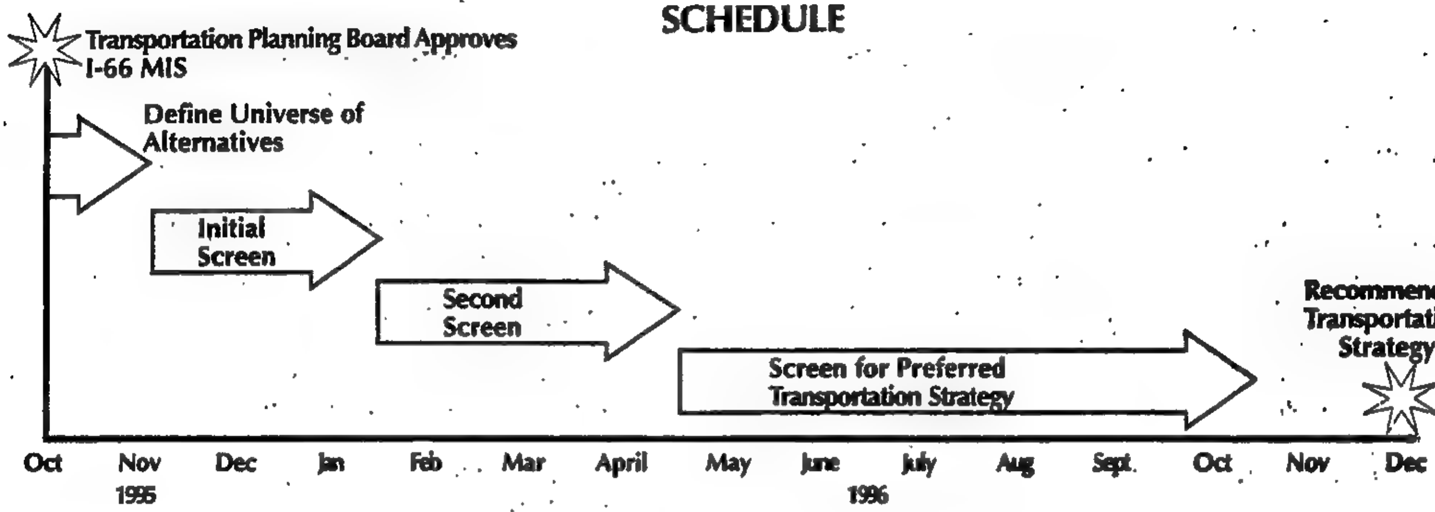
Five public information meetings are scheduled during the study. Each meeting will be conducted at two locations on separate nights. Every public meeting will provide opportunities to get questions answered and contribute comments or suggestions to the project development process. Notice of the public meetings will be published in the Washington Post and local newspapers and will also be mailed to everyone on the project mailing list.

## *QUESTIONS, COMMENTS, SUGGESTIONS?*

**Call the I-66 HOTLINE**

**1-800-811-4661**

## SCHEDULE




**I-66 Major Investment Study**


Gary Kuykendall
DRPT
1401 E. Broad Street, Room 1412
Richmond, VA 23219-1939

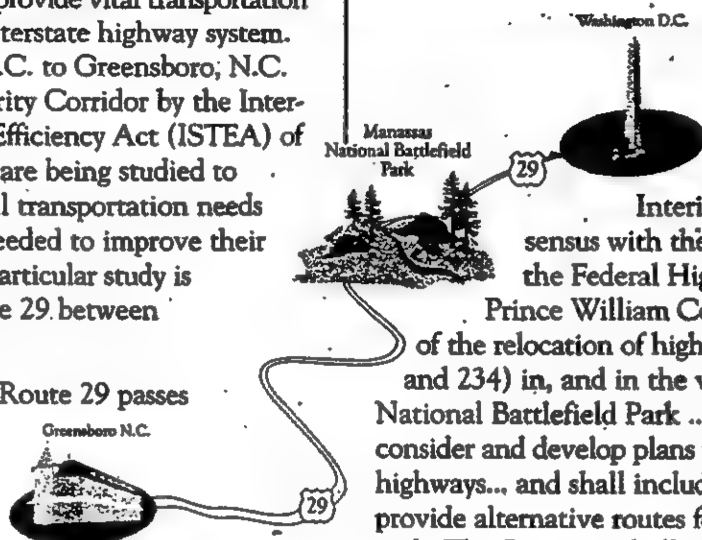
Issue 1 December 1996

# Traveller

## The Situation:

Route 29 is a major component of the National Highway System — important roads that provide vital transportation linkages supplementing the interstate highway system. Route 29 from Washington D.C. to Greensboro, N.C. was designated as a High Priority Corridor by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Sections of the corridor are being studied to determine how well they fulfill transportation needs and what changes might be needed to improve their performance and safety. This particular study is looking at the section of Route 29 between Warrenton and Centreville.

Throughout most of Virginia, Route 29 passes through historic landscape - perhaps no place more sensitive than in Manassas, where it traverses Manassas National Battlefield Park. Concerned about the impact the presence of the highway has on the historic integrity of the battlefield, Congress in 1988 enacted the Manassas National Battlefield Park Amendments of 1988 which state, "The Secretary of the Interior, in consultation and consensus with the Commonwealth of Virginia, the Federal Highway Administration and Prince William County, shall conduct a study of the relocation of highways (known as routes 29 and 234) in, and in the vicinity of, the Manassas National Battlefield Park ... The study shall specifically consider and develop plans for the closing of those public highways... and shall include analysis of ... means to provide alternative routes for traffic now transecting the park. The Secretary shall provide for extensive public involvement in the preparation of the study."




## The Study:

The purpose of the Route 29 Corridor Development Study is to identify and evaluate potential Route 29 improvement and alignment options between Warrenton and Centreville. The products of this study will include:

- A preliminary identification of the community, cultural, historic and environmental resources that exist in the Route 29 study area.
- An evaluation of the relative impacts of Route 29 improvement and alternative alignment options.
- Identification of the most promising Route 29 improvement or alignment options recommended for further study.

The alternative evaluation process will consider the following factors:

- Concerns and opinions of the public and local government jurisdictions
- Transportation system operations,
- Environmental screening including preliminary identification of potential impacts on existing development, wetlands, historic resources, hazardous materials sites, community resources and vegetation.

This study is the first step in the corridor development process and will result in identification of the most promising alignment options for further study. Additional, more detailed design studies and environmental evaluations will be conducted depending on the outcome of this study. These subsequent studies will be made available to the public and local governments for review and comment in order to select a preferred alternative for the corridor.

## The Alternatives:

The VDOT planning team is exploring several concepts to address congestion and safety issues over the entire corridor from Centreville to Warrenton, as well as several potential alignments for relocating the segment of Route 29 from the National Park. These alignment options are illustrated inside the newsletter and include the following:

**No-Build** - Route 29 would remain on its existing alignment, with little or no improvements

**Widen Existing Route 29** – Route 29 would be widened at selected locations along its existing alignment.

**Designate Route 29 on I-66** - Route 29 would "share the roadway" with I-66 from Centreville to Gainesville.

**South Bypass** - A frontage road either north or south of I-66 (but south of the battlefield) would be constructed and designated as Route 29.

**North Bypass** - A new roadway north of the park would be constructed and designated as Route 29.

All options – except the No-Build option – would likely close Route 29 within the Park to through traffic. However, this decision is dependant on the alignment alternative selected, subsequent studies, public input and the desires of the National Park Service.

## Your Involvement:

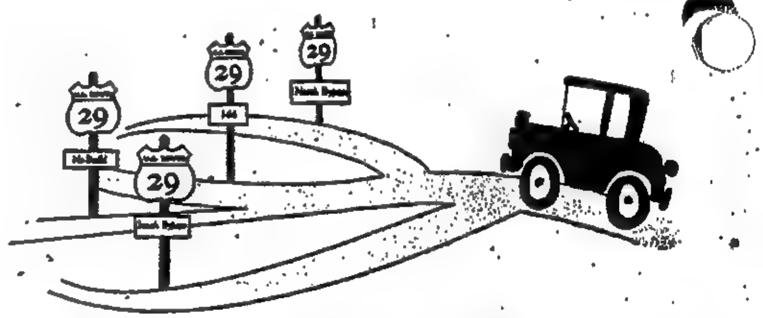
Your opinions and concerns are an important part of the study process. What can you do to provide input to the study?

**By Phone:** Call 1-800-811-4661 (Device for the hearing impaired: 1-800-307-4630). Voice your comments and suggestions and get your name on the mailing list.

**By Mail:** Fill out the enclosed comment sheet, fold as indicated, apply postage and mail it in to:

**Route 29 Corridor Development**
**Study–VDOT**
**c/o MMA**
**814 King Street, Suite 400**
**Alexandria, VA 22314**

**In Person:** Attend the Public Information Meeting scheduled for January 27, 1996 at Mountain View Elementary School from 6:00 to 9:00 PM.




## Other Studies in the Area:

There are a number of other studies being conducted that will potentially affect transportation facilities in the Route 29 corridor including:

- I-66 Corridor Major Investment Study – This study is evaluating a range of transportation strategies for the I-66 corridor from Route 15 to the Beltway.
- Western Transportation Corridor Study – This study is evaluating options for a north-south roadway west of the Battlefield.
- Manassas Railroad Alignment Improvement Study – This study is evaluating options to relocate the Norfolk Southern Railroad in the vicinity of Gainesville.
- Manassas National Battlefield Park General Management Plan – The National Park Service is in the process of revising the long-range plan for the park.

# Public Information Meeting – January 27, 1997

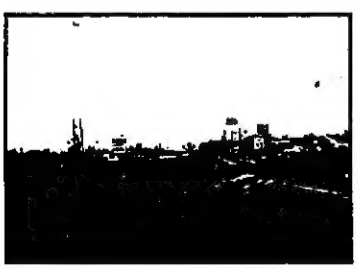
You are invited to attend a public information meeting for the Route 29 Corridor Development Study scheduled for:

Monday, January 27, 1997
(Snow Date: February 3)
Mountain View Elementary School
5600 McLeod Way, Haymarket
6:00 to 9:00 p.m.

There will not be a formal presentation. Interested persons are encouraged to stop in at their convenience to view maps and gain additional information on the project. Project staff will be on-hand to assist and answer questions.

*Route 29 at New Baltimore*

Fauquier County has restricted development to the south side of existing Route 29. The County Comprehensive Plan identifies a bypass in the New Baltimore area.



*Gainesville Railroad Crossing*

The railroad crossing and traffic signals in Gainesville are existing bottlenecks along Route 29.

*Route 29/Route 234 Intersection with Stone House*

The intersection of Route 29 and Route 234 in Manassas National Battlefield Park is seriously congested during peak traffic hours.

# The Study Team:

The Route 29 Study is being conducted by the Virginia Department of Transportation (VDOT) and the Department of Rail and Public Transportation. The study will be reviewed by the Technical and Policy Advisory Committees established for the I-66 Corridor Major Investment Study.

The Policy Advisory Committee will make recommendations for further actions to the Secretary of Transportation and the Commonwealth Transportation Board.

### Technical Advisory Committee:

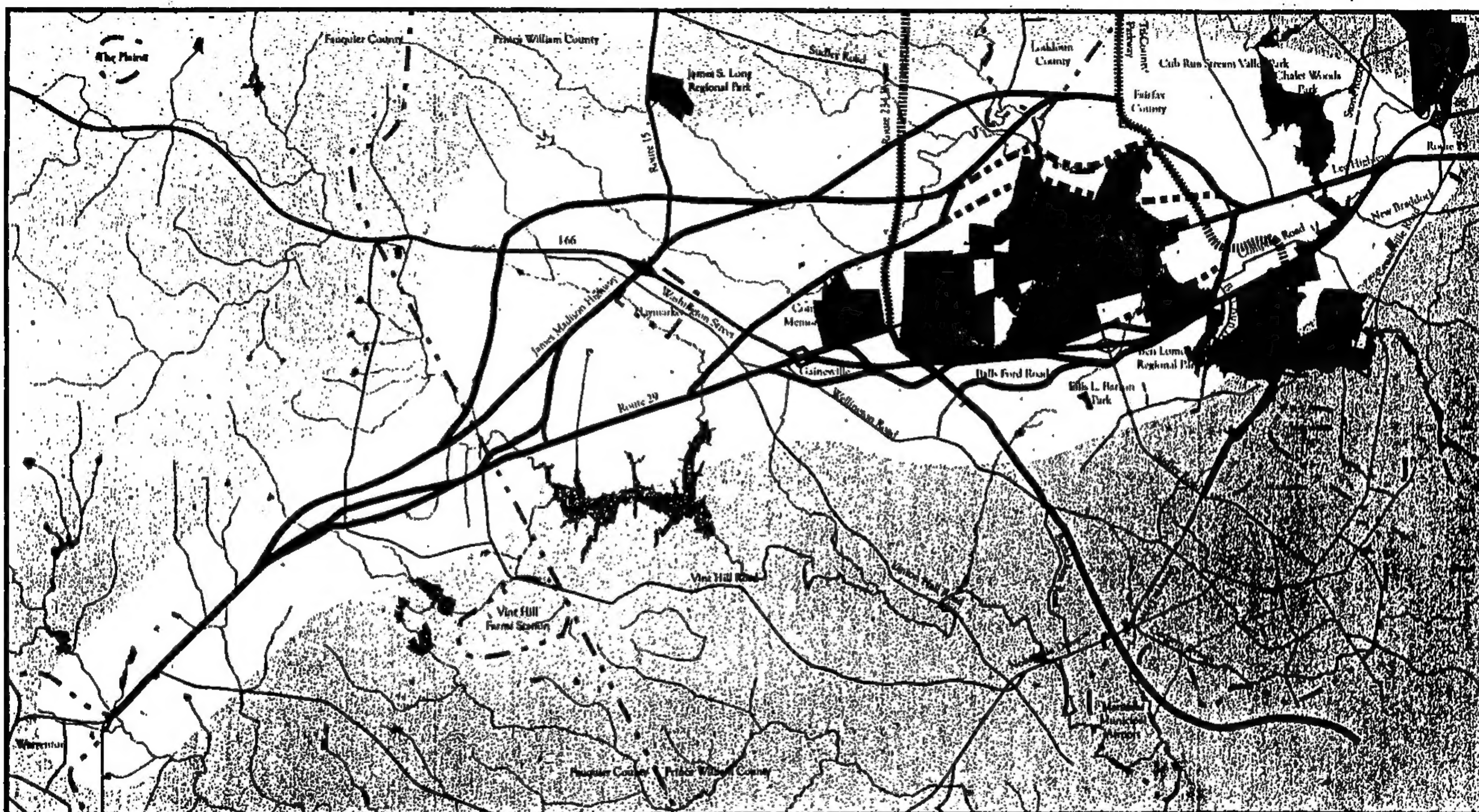
Virginia Department of Transportation
Virginia Department of Rail and Public Transportation
Federal Transit Administration
Federal Highway Administration
National Park Service
Metropolitan Washington Council of Governments
Northern Virginia Transportation Commission
Potomac-Rappahannock Transportation Commission
Virginia Railway Express
Washington Metropolitan Area Transit Authority
Metropolitan Washington Airports Authority
Arlington County
Fairfax County
Fauquier County
Loudoun County
Prince William County
City of Fairfax

### Policy Advisory Committee:

Robert T. Lee, Chair, *Commonwealth Transportation Board*
Ellen M. Bozman, *Arlington Board of Supervisors*
Michael R. Frey, *Fairfax County Board of Supervisors*
John Mason, Mayor, *City of Fairfax*
David C. Mangum, *Fauquier County Board of Supervisors*
Kathleen Seefeldt, *Prince William County Board of Supervisors*
David Snyder, *City of Falls Church*
Robert B. Dix, Jr., *Fairfax County Board of Supervisors*
Katherine K. Hanley, *Fairfax County Board of Supervisors*
Charles A. Robinson, Jr., Mayor, *Town of Vienna*
Edgar S. Wilbourn, III, *Prince William County Board of Supervisors*

Virginia Department of Transportation
C/O MMA
814 King Street
Alexandria, VA 22314

# Route 29 Candidate Alignments




12/6/96

U.S. Route 29 Corridor Development Study
Warrenton To Centreville, Virginia

Legend:
- Existing Route 29
- Route 29 Candidate Alignment
  NOTE: The candidate alignments represent a potential roadway corridor approximately 1000 feet wide.
- Route 29 Candidate Alignment Not Recommended for Further Study (These options were identified in previous studies conducted prior to the expansion of Manassas Park and are not recommended for further study)
- Planned Roadway in CLRP
- Planned Roadway Not in CLRP
- Candidate Alignment on Planned Roadway Not in CLRP

0 1 2 Miles

N

Data Sources:
Prince William County Office of Mapping & Information Resources
Fairfax County Department of Information Technology, GIS and Mapping Services
U.S. Census Bureau TIGER Line Files (Fauquier County)
Virginia Department of Transportation, State Highway Map
Fairfax County Comprehensive Land Use Plan
Prince William County Comprehensive Plan
ADC Map Books

# Route 29 Corridor Development Study

## Warrenton to Centreville

## Comments, Questions, Suggestions

This is your opportunity to be heard - Before any decisions have been made.

- ☞ What do you think should be done with Route 29?
- ☞ Is there a need to relocate Route 29 out of Manassas National Battlefield Park?
- ☞ Is there a need to upgrade Route 29 west of the park?
- ☞ What alignment options do you prefer?
- ☞ Are there other alignment options that should be considered?
- ☞ What are your primary concerns about alternative locations for Route 29?

Please give us your written comments below or use the map on the back to sketch your ideas and illustrate your concerns. Your comments and suggestions will be incorporated into the information provided to the project advisory committees. Thanks for your input!

Name: ______________________

Address: ______________________

______________________

PLACE STAMP HERE

Route 29 Corridor Development Study
c/o MMA
814 King Street, Suite 400
Alexandria, VA 22314